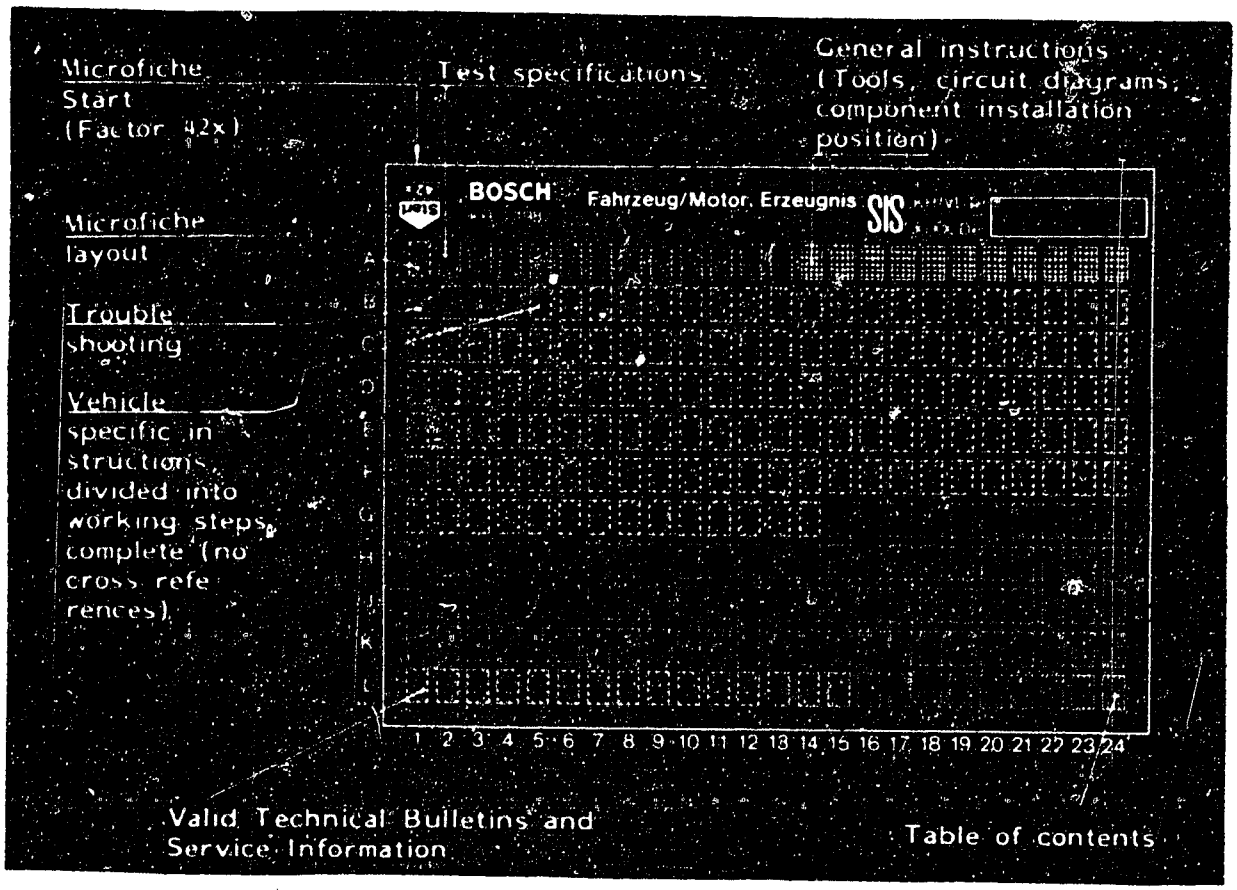
Microfiche layout



1. Read from left to right

2. Title of microfiche (appears on each coordinate)

E16	Product/assembly/test step Vehicle/engine	

Coordinate

3. Limits of section

Beginning	Mid-section	End	One-page section

4. Purely vehicle-specific passages in the text are marked with a vertical bar.

5. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

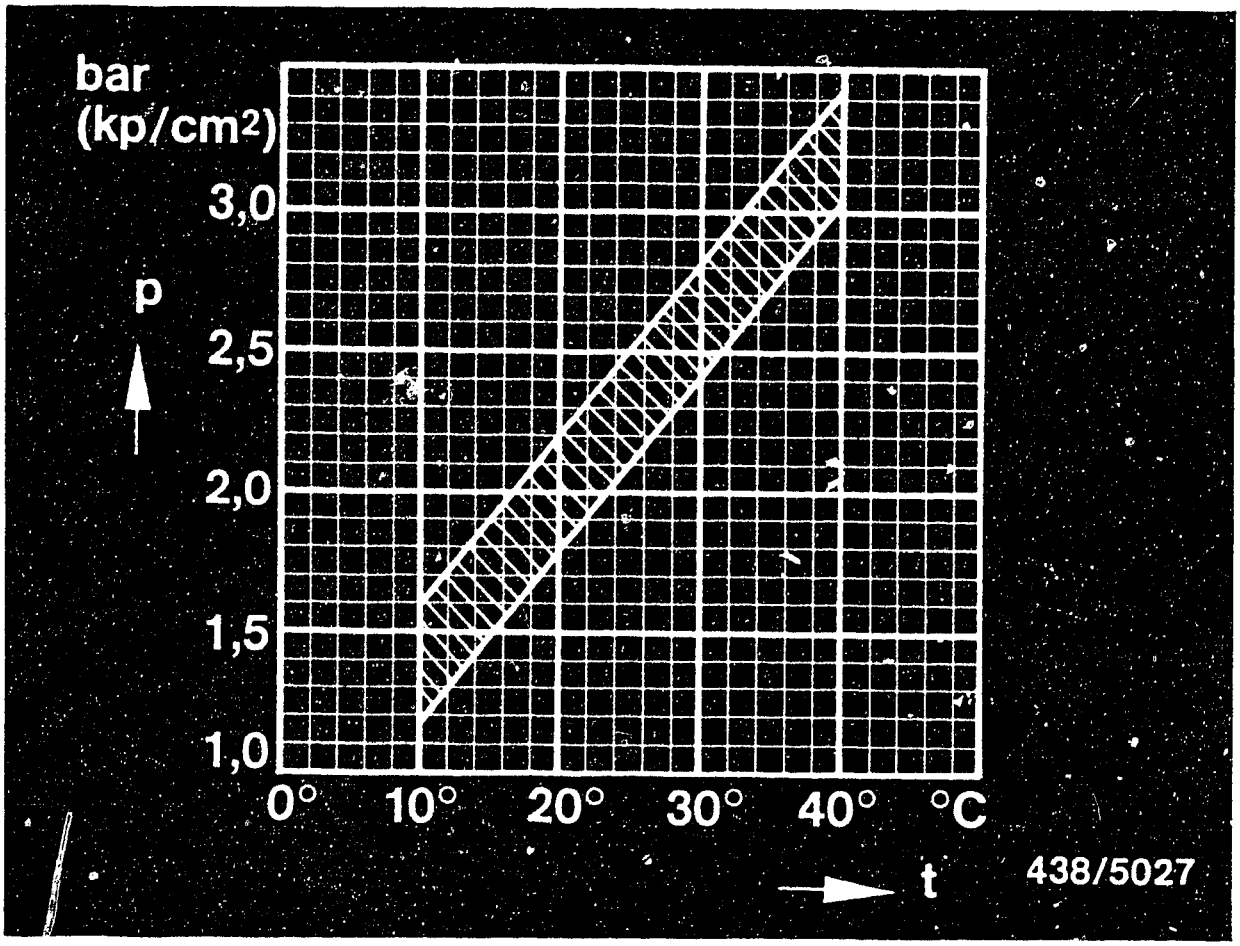
C6

1. Test specifications

1.1 Electric fuel pump

B21

Test step	Test specifications
Fuel delivery:	min. 1000 cm^3/30 s



p = Control pressure
t = Ambient temperature

C9

Control pressure "cold"

(Part No. of warm-up regulator: 0 438 140 017
0 438 140 033
For testing, connect vacuum pump to intake-manifold-pressure connection of warm-up regulator.

Setting value: 520...546 mbar
(390...410 mmHg)

Test step	Test specifications *

C9

1.3 "Warm" control pressure

Part No. of warm-up regulator: 0 438 140 017
0 438 140 033
(Version for intake-manifold-pressure-controlled full-load enrichment)

- Test with atmospheric pressure (without vacuum) 2.7...3.1 bar (2.8...3.2 kgf/cm²)

- For testing, connect vacuum pump to intake-manifold-pressure connection of warm-up regulator.

  Setting value:
  520...546 mbar
  (390...410 mmHg) 3.4...3.8 bar (3.5...3.9 kgf/cm²)

- Leak test on full-load diaphragm
  Maximum pressure drop
  from setting value: 100 mbar (75 mmHg) / 15 s

Note: During the first months of production of the 911 model the vacuum control of the warm-up regulator only took place as of increased idle speed. See the layout of lines of the vacuum system on Coordinate A 10. In case of trouble due to part-load bucking the layout can be converted to the solution later adopted in series production. Also see the detailed information on Coordinate A 11.

* Pressures in the test specification table are given in bar (gauge pressure) and in kgf/cm² (gauge pressure).

Test step	Test specifications

1.4 Primary pressure

D2

Fuel distributor:

0 438 100 006
0 438 100 010

Checking value: 4.5...5.2 bar (4.6...5.3 kgf/cm²)
Setting value : 4.9...5.1 bar (5.0...5.2 kgf/cm²)

1.5 Leak test

D10

Minimum pressure	1976 model	1977 model
after 10 minutes:	1.9 bar(2.0kgf/cm²)	1.3 bar(1.4kgf/cm²)
after 20 minutes:	1.7 bar(1.8kgf/cm²)	1.1 bar(1.2kgf/cm²)

1.6 Injection valves

E6

0 437 004

Opening pressure: 2.5...3.6 bar (2.6...3.7 kgf/cm²)

Pressures in the test specification table are given in bar (gauge pressure) and in kgf/cm² (gauge pressure)

1.7 Fuel distributor

F1

0 438 100 006
0 438 100 010

Delivered-quantity comparison at the outlets	Setting point	Max. allowable delivery
Idle	6.0 cm^3/min	6.8 cm^3/min
Part load	40.0 cm^3/min	44.0 cm^3/min
Full load	140.0 cm^3/min	153.0 cm^3/min

F16

1.8 Idle adjustment:

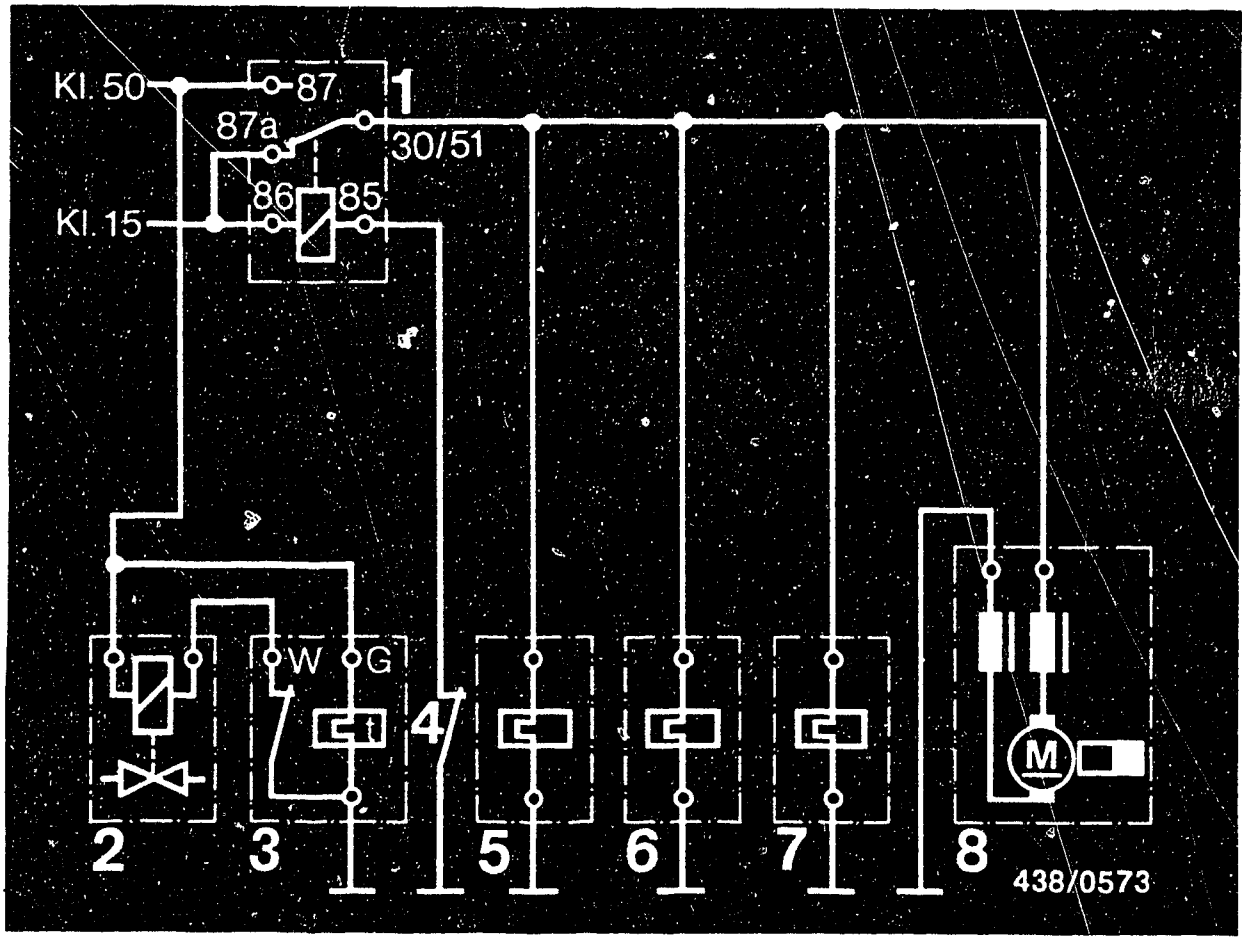
Idle speed

with manually-shifted transmission: 850...950 min^{-1}

with Sportomatic: 900...1000 min^{-1}

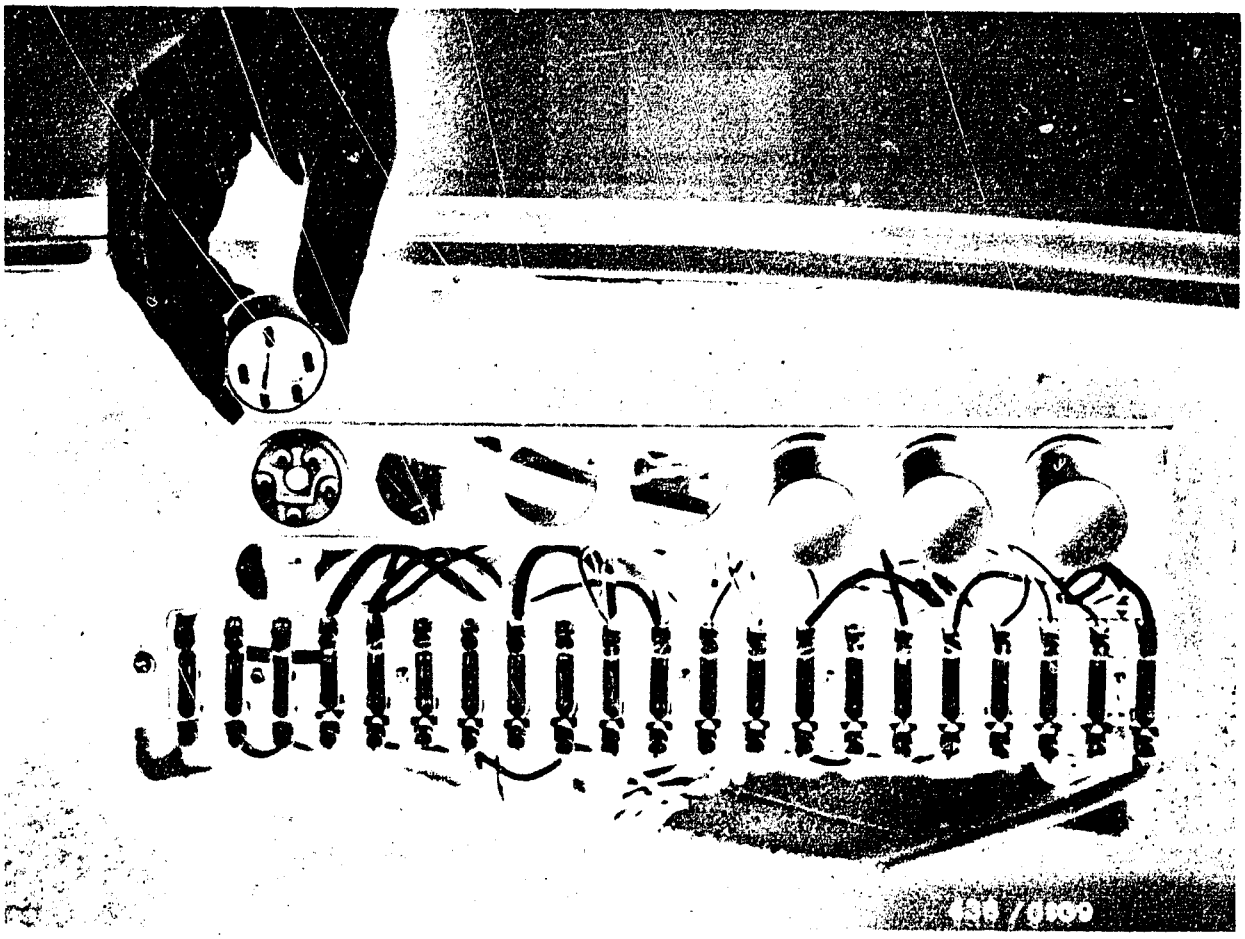
CO concentration (% by vol.):

All models: 1.0...1.5 % by vol. CO



2. Electrical safety circuit

1 = Electronic relay
2 = Start valve
3 = Thermo-time switch
4 = Air-flow sensor contact
5 = Warm-up regulator
6 = Auxiliary-air device
7 = Thermostat valve
8 = Electric fuel pump

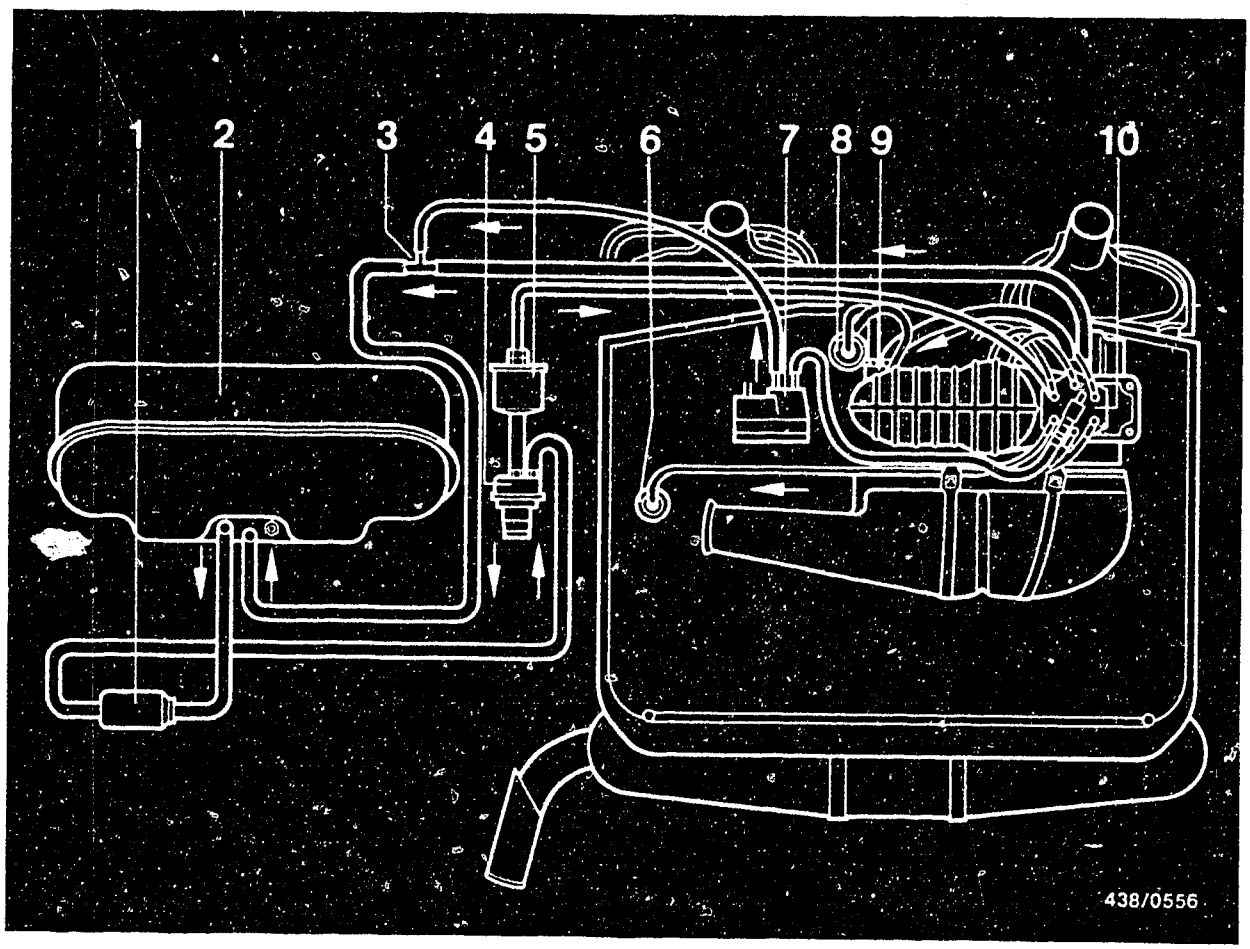


2.1 Bridging the electrical safety circuit for testing:

The electrical safety circuit can be bridged by removing the plug from the air-flow sensor.

Since this plug is not readily accessible, it is also possible to bridge terminals 30 and 87a of the relay.

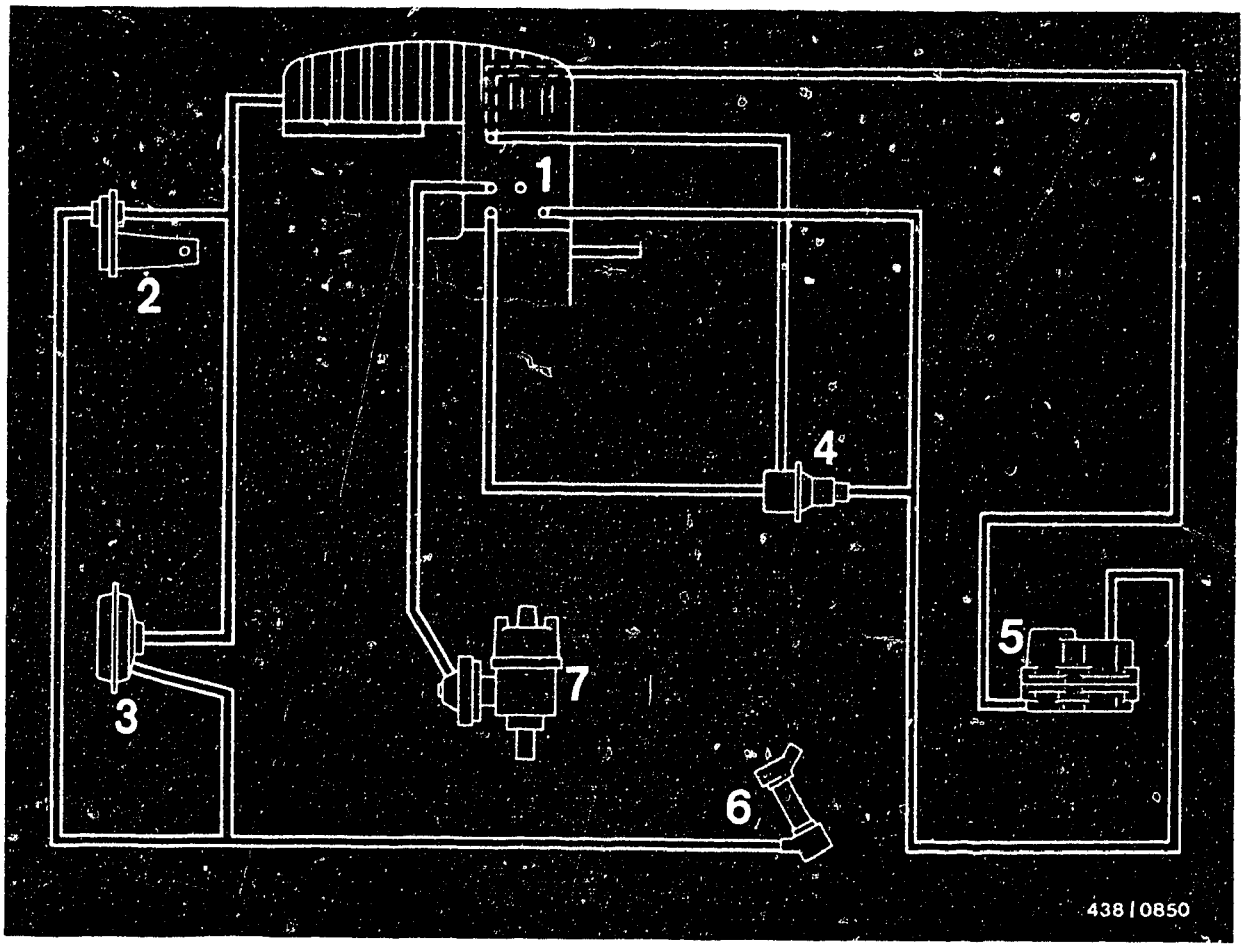
The relay is located on the central-electrics console in the luggage compartment (on the left-hand side as viewed from behind the vehicle), rear relay.



3. Diagrams

3.1 Diagram of fuel lines

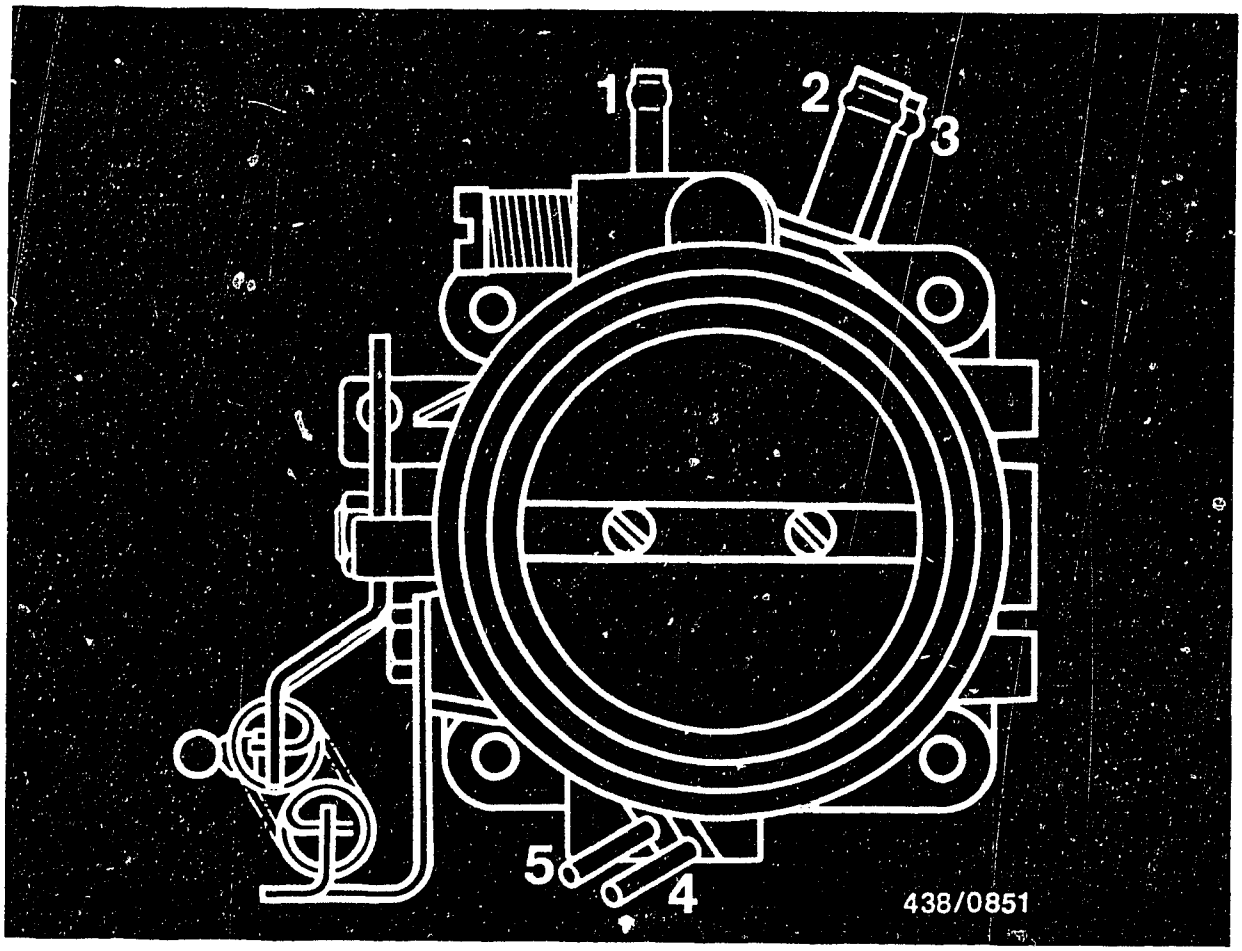
1 = Electric fuel pump
2 = Fuel tank
3 = Connecting piece for fuel return lines
4 = Fuel accumulator
5 = Fuel filter
6 = Injection valve
7 = Warm-up regulator
8 = Vacuum limiter
9 = Start valve
10= Mixture-control unit



1 = Throttle-valve assembly
2 = Auxiliary-air device
3 = Auxiliary-air valve
4 = Vacuum limiter
5 = Warm-up regulator
6 = Vacuum connection fitting for auxiliary-air device and auxiliary-air valve
7 = Ignition distributor

3.2 Layout of lines in vacuum system

Note: The illustration shows the layout of lines during the first months of production of the 911/1976 model. As of 26.1.1976 the control of the warm-up regulator was changed. See the following coordinates.



Layout of vacuum connections on throttle-valve assembly of 911 model up to production date 25.1.1976:

1 = Vacuum connection for warm-up regulator and for control line of vacuum limiter. External connection through T-piece.
2 = Vacuum limiter, side connection
3 = Vacuum limiter, lower connection
4 = Atmospheric pressure connection for warm-up regulator
5 = Vacuum connection for ignition distributor

In case of complaints due to part-load bucking with this layout the control of the warm-up regulator can be converted to the layout as of 26.1.1976. This layout as well as further information are described on the following coordinates.

Layout of vacuum connections at throttle-valve assembly of Carrera model as of start of series production and of 911 model as of 26.1.1976:

1 = Vacuum limiter control line
2 = Vacuum limiter, side connection
3 = Vacuum limiter, lower connection
4 = Atmospheric pressure connection for warm-up regulator
5 = Vacuum connection for warm-up regulator and ignition distributor

Action to be taken in case of complaints due to part-load bucking:

The following action can only be taken in the case of the above-mentioned complaints as of engine numbers

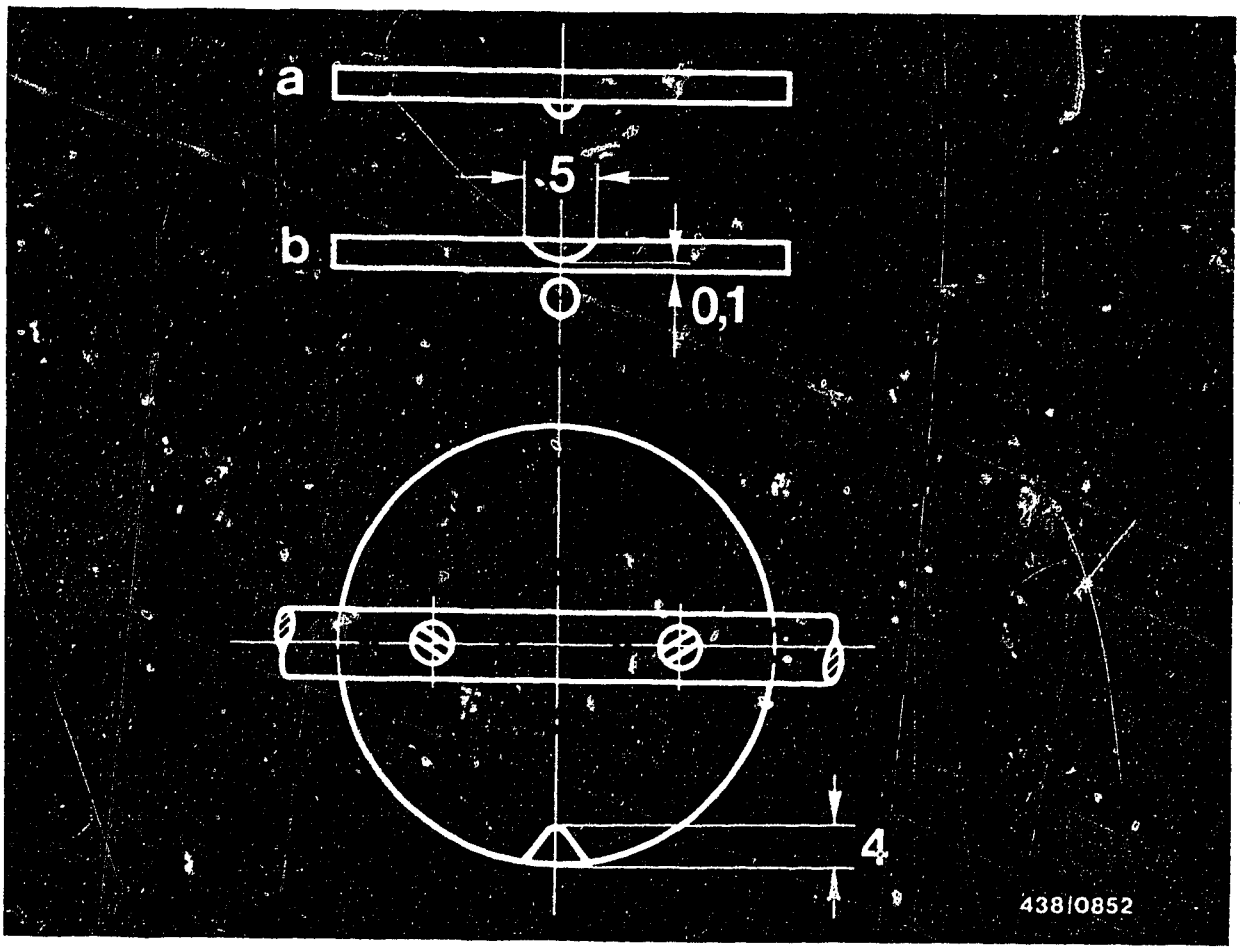
636 1001 - 911/81
636 9001 - 911/86:

1. It must first of all be ensured that engine and ignition are in proper condition/adjustment, i.e. valve timing accurately set, minimum possible differences between both banks of cylinders.

   Check the condition of the chains/camshafts and guiding blades.

2. Convert the vacuum control for the warm-up regulator to the version as of 26.1.1976.

   Important: Connect the vacuum line for warm-up regulator and ignition distributor externally with a T-piece. Length of hose between T-piece and warm-up regulator max. 50 mm.



3. Carry out the following operations on the throttle-valve assembly:

   - Remove the throttle-valve assembly.

   - Check the position of the closed throttle valve in relation to the ignition distributor/warm-up regulator vacuum port:

     The port should be partially covered by the bottom edge of the closed throttle valve, but max. 0.3 mm (a).

If the port is completely free below the bottom edge of the closed throttle valve (maximum clearance 0.3 mm), a notch should be filed into the top edge of the throttle valve in the region of the port using a small round file (b).

Caution: The residual thickness of the throttle valve on the filed edge must be at least 0.1 mm.

Install the throttle-valve assembly with new O-ring, paying attention to the correct position of the O-ring.

4. If it is necessary to replace the warm-up regulator, it is advisable to install the version 0 438 140 033 of the 1977 model.

5. Check whether, with the idle speed correctly set, there is vacuum at the warm-up regulator and ignition distributor.

With the hose pulled off, the engine speed must rise to approx. 1500...2000 min^{-1}.

6. If necessary, the CO concentration can be raised to max. 2.5 % by vol.

4. General information

4.1 Introduction:

The present repair instructions refer to the Porsche vehicles 911 and Carrera, 1976 and 1977 models. They give a concise descripton of the testing and adjustment operations to be performed on the vehicle on the K-Jetronic.

All the system components are dealt with in separate working steps with the corresponding test specifications.

In addition to this repair manual the appropriate testing and repair manuals will, of course, be issued for every other vehicle type equipped with the K-Jetronic.

The K-Jetronic differs from other known fuel-injection systems in terms of both construction and operation. In order to be able to carry out the testing procedures described in this manual - and therefore to be able to assess the components - the K-Jetronic and its operation should be clearly understood. The essential points of the operation and construction of the K-Jetronic are described in Technical Instruction VDT-U 3/1 En.

When trouble-shooting the K-Jetronic, it is assumed that the ignition is in order and that the engine is in proper mechanical condition.

The individual test steps of this repair manual are detailed and self-contained. This permits direct trouble-shooting without having to go through the entire test program for each fault.

The trouble-shooting chart on Coordinates B 1 - B 4 is intended to make it easier to decide which test steps have to be carried out for certain faults.

According to the symptom stated by the customer or which you yourself have determined, select the possible cause in the trouble-shooting chart. The coordinate at the end of the cause column refers to the appropriate test step with the associated test specification.

Important note:

If any fuel connections are loosened, parts removed, also on the vacuum system, always use new seals when re-connecting or re-installing.

4.2 Design of the K-Jetronic

The K-Jetronic is identical in both vehicle models and corresponds to the basic design as described in Technical Instruction VDT-U 3/1 En.

The warm-up regulator is a version for intake-manifold-pressure-controlled full-load enrichment.

Both models are equipped with automatic engine speed limitation. This is done by a mechanical engine-speed limiter (ignition cut-off) in the distributor rotor.

Cutoff speed 6800 ± 200 min^{-1}.

4.3 Other equipment

Both models are equipped with a vacuum limiter and auxiliary-air valve (see also layout of lines in vacuum system, Coordinate A 10).

The vacuum limiter is a vacuum-controlled auxiliary-air valve which opens only on the overrun, thereby supplying the engine with additional air by bypassing the closed throttle valve.

In all other operating conditions the vacuum limiter must be closed.

The auxiliary-air valve is briefly open during the starting of the engine and is closed at idle and at part load. During full-load operation the valve opens again.

Control is by means of the vacuum acting on the diaphragm.

4.4 Vehicle-related information

During the first months of production of the 911 model (up to 25.1.76) the vacuum control of the warm-up regulator only took place at increased idle speed (approx. 1800 min^{-1}, i.e. at idle the control pressure was approx. 2.9 bar according to the full-load value. The reason for this effect is in the layout of the vacuum tap in the throttle-valve assembly.

As of 26.1.76 the control configuration was modified in series production.

In vehicles supplied up until 25.1.76 it may happen that despite correct setting of engine and ignition there is the complaint of part-load bucking.

In such cases the vacuum control of the warm-up regulator can be converted to the solution adopted in series production as of 26.1.76.

The conversion as well as other action to be taken for this complaint are described on Coordinates A 11 - A 14.

5. Test equipment and tools

- Pressure tester KDJE-P 100 (previously KDEP 1034)

For testing all fuel pressures and testing for leaks.

- Connecting-parts set KDJE-P 100/10 (previously KDEP 1034/10)

For connecting pressure tester KDJE-P 100 (previously 1034/10) to the control-pressure port of the fuel distributor.

- Adjusting wrench KDEP 1035

For adjusting the idle-mixture-adjusting screw in the mixture-control unit (CO-adjustment).

- Guide ring KDEP 1040/10 (dia. 80 mm)

For centering the air-flow sensor plate in the air-flow sensor.

- Tester for delivered quantity comparison KDJE-P 200 (previously KDJE 7451)

For comparing the fuel delivered from the individual fuel-distributor outlets.

- Electric connecting cable (test lead)

KDJE 7450/70 for the direct connection of components to be tested, e.g. cold-start valve.

- Assembly tool KDEP 1039 for pressing on the Polyamide fuel line when replacing the non-return valve on the electric fuel-supply pump of the 1976 model.

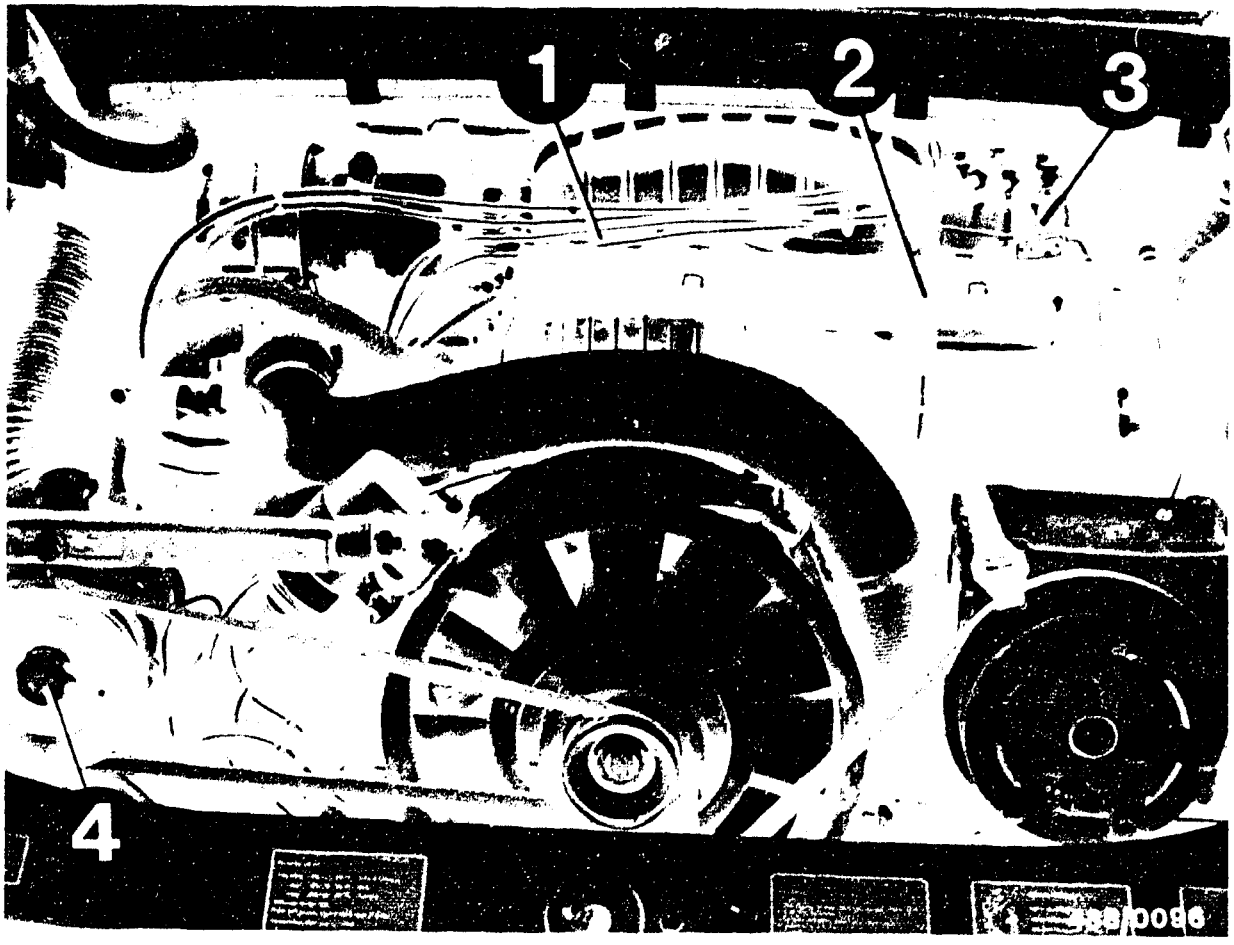
- Valve tester KDJE-P 400 (previously KDJE 7452).
  For testing the injection valves.

  Test media: Calibrating fluid (Shell K 30, Esso-Varsol, Shell Mineral Spirits 135) or
  Bosch, Part Designation VS 14942-CH
  Previously Part No. 5 973 340 650
  The Bosch calibrating fluid can be obtained in 5 l metal cans from the following supplier:
  Firma
  Oskar Gnamm GmbH & Co
  D-7531 Kämpfelbach-Bilfingen

Caution:
For safety reasons, never use normal gasoline or similar easily inflammable and combustible liquids.
Even with calibrating fluid, be sure to observe the local official regulations.

- Tachometer (commercially available)
  For idle-speed adjustment.
- CO meter (commercially available)
  For idle-speed CO adjustment.
- Vacuum pump (commercially available)
  For testing the warm-up regulators with full-load enrichment dependent on intake-manifold pressure, e.g. the vacuum hand-operated pump from

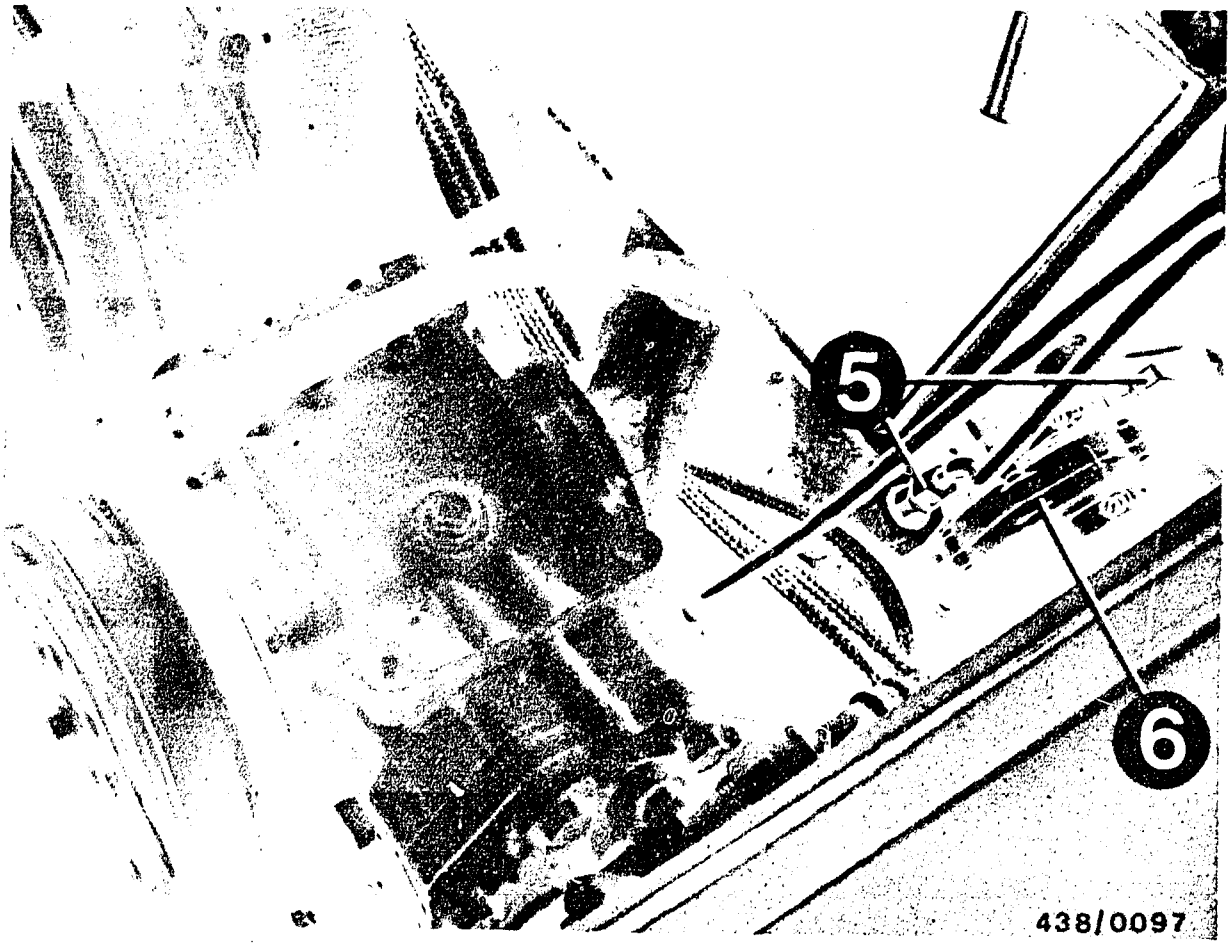
  Firma Korinth
  Ludwig-Kloos-Strasse 21
  6450 Hanau 7 (Steinheim)



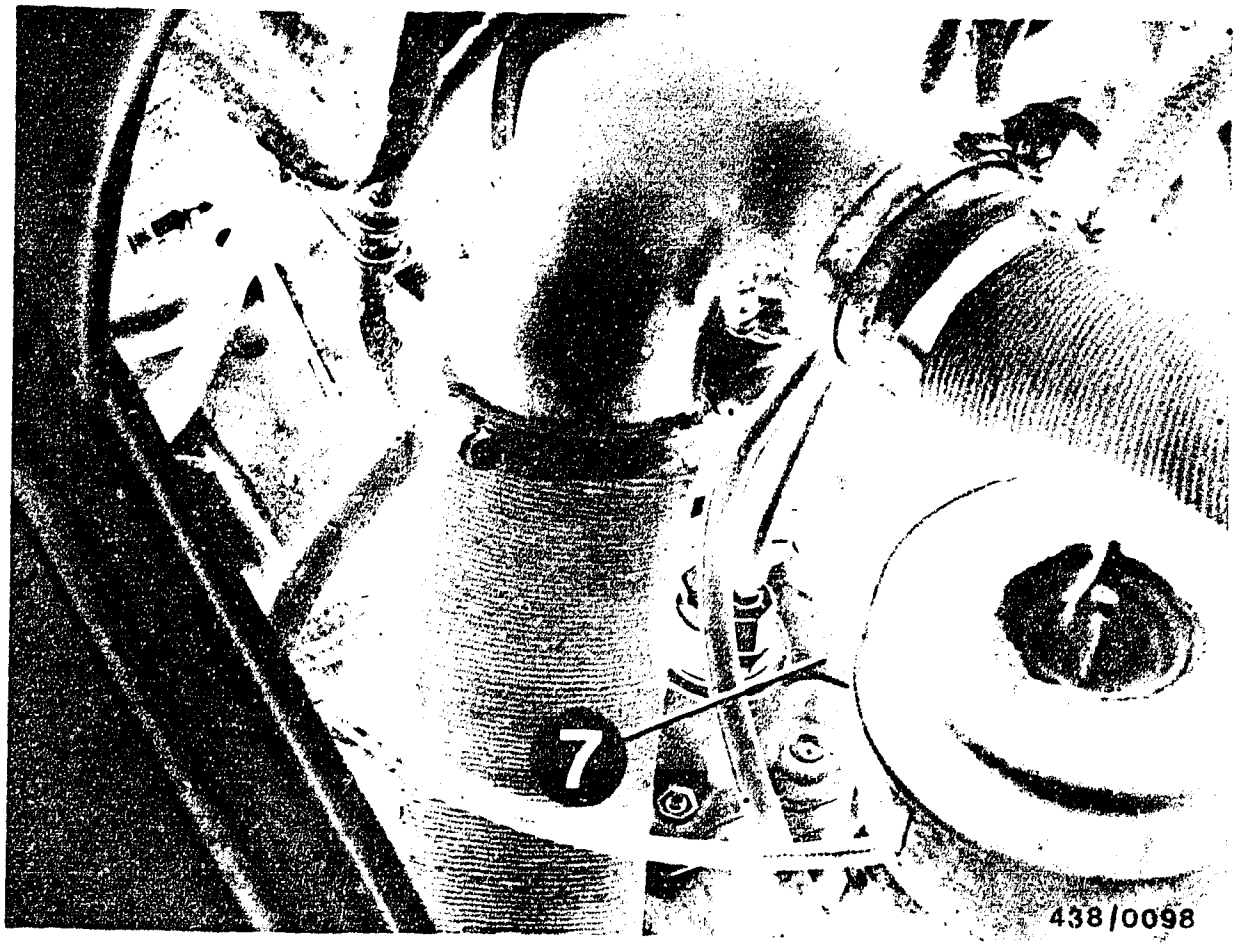
1 = Throttle-valve assembly
2 = Intake housing
3 = Mixture-control unit (air filter removed)
4 = Secondary-air pump

6. Installation position of individual components

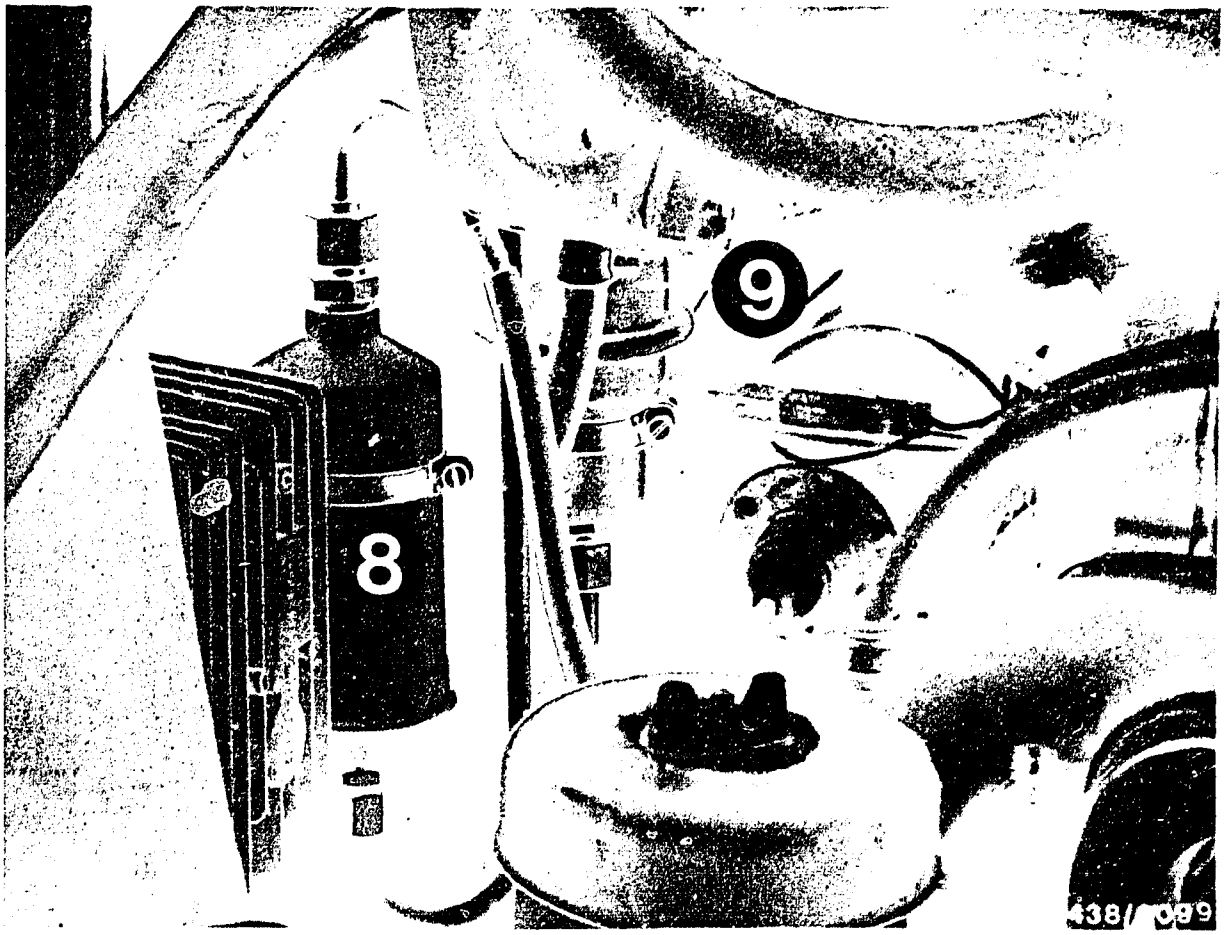
Note: The illustration shows a view of the engine of the USA model with secondary air pump which is not installed in the European model.
The start valve is installed on the back of the intake housing below the throttle-valve assembly (not visible in the picture).
The thermo-time switch is in the engine block below the secondary-air pump (likewise not visible in the picture).



5 = Injection valves; each plugged into the flange of the intake tube.
6 = Auxiliary-air device



7 = Warm-up regulator



8 = Fuel filter
9 = Fuel accumulator

Installation position of electric fuel pump

The electric fuel pump is positioned at the front, in front of the front-axle auxiliary support.

Caution:
When re-fitting the dirt-deflector plate, be absolutely sure to read the information on Coordinates B24 and D17.

Customer complaint (fault symptom)

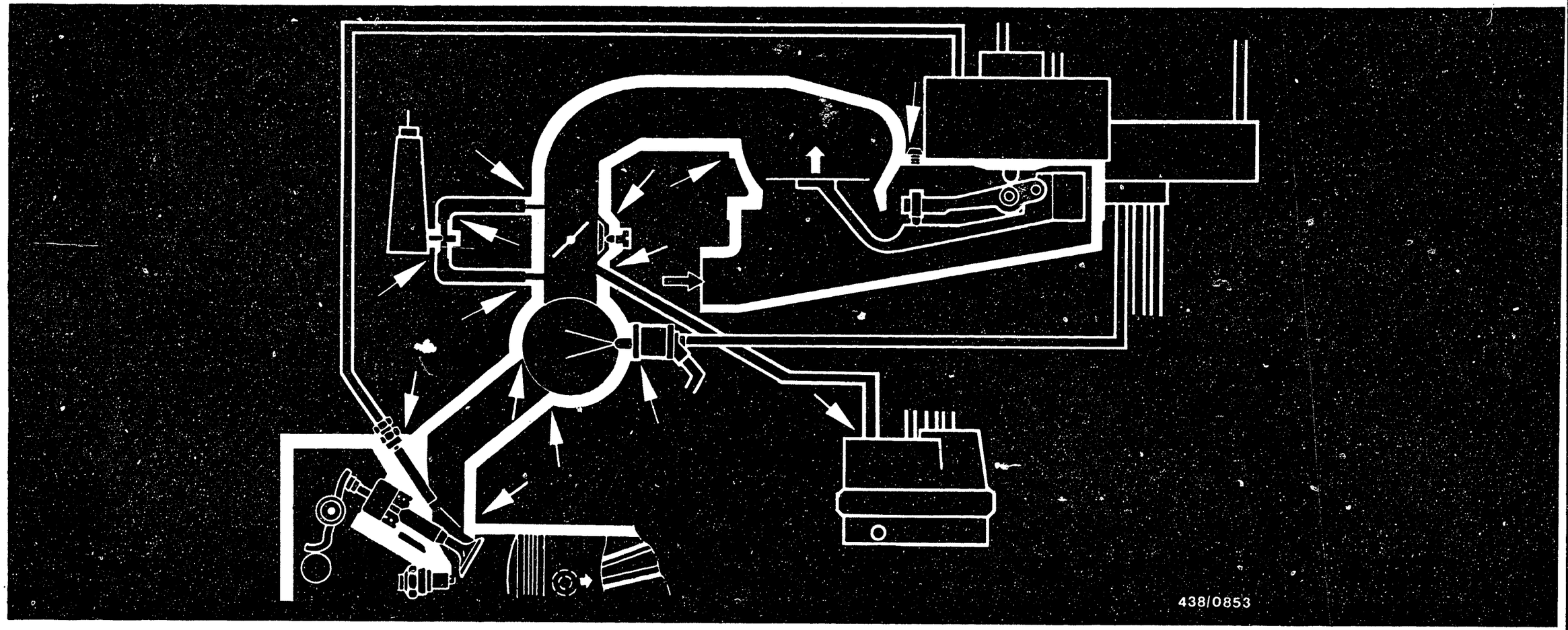
1.	2.	3.	4.	5.	6.	7.	Cause	Coordinates
	●	●	●	●		●	Vacuum system leaking	B 5
●	●		●	●	●	●	Air-flow sensor lever and/or control plunger not moving smoothly	B 7
	●						Position of the air-flow sensor plate incorrect	B15
●		●					Auxiliary-air device does not open	B19
●	●				●		Electric fuel pump not operating	B21
●							Cold-start system defective	C 4
		●	●				Cold-start valve leaking	C 6
				●			Excessive fuel delivery for control-pressure circuit	C11
●		●					"Cold" control pressure outside tolerance	C 9
	●		●	●	●	●	"Warm" control pressure too high (after warm-up)	C 9
			●	●		●	"Warm" control pressure too low (after warm-up)	C 9
					●	●	Primary (system) pressure outside tolerance	D 2
	●						Overall fuel system leaking	D10
●	●	●	●		●		Injection valves leaking, opening pressure too low	E 6
●	●	●	●			●	Unequal fuel delivery (imbalance of fuel delivery)	F 1
●	●	●	●	●			Basic idle adjustment incorrect	F16
						●	Throttle plate does not open completely	

*Note:
If, in the case of Symptom 2, after checking and repairing all the fault causes listed below, the hot-start characteristic is still unsatisfactory this can be improved by fitting an impulse relay.
The fitting of this relay is described in Coordinates L 4

Customer complaint (fault symptom) (continued)

8. Engine runs on after being switched off ("diesels")
9. Fuel consumption too high
10. Flat spot during acceleration
11. CO concentration during idling too high
12. CO concentration during idling too low
13. Idle-speed cannot be adjusted (too high)
14. Engine starts but then immediately stops

8	9	10	11	12	13	14	Cause	Coordinates
		●		●			Vacuum system leaking	B 5
●		●	●	●			Air-flow sensor lever and/or control plunger not moving smoothly	B 7
●							Position of the air-flow sensor plate incorrect	B15
							Auxiliary-air device does not open	B19
					●		Auxiliary-air device does not close	B21
						●	Electric fuel pump not operating	C 4
							Cold-start system defective	C 6
●	●		●				Cold-start valve leaking	C11
		●				●	Excessive fuel delivery for control-pressure circuit	C 9
		●				●	"Warm" control pressure too high (after warm-up)	C 9
	●	●	●			●	"Warm" control pressure too low (after warm-up)	C 9
		●				●	Primary (system) pressure outside tolerance	D 2
							Overall fuel system leaking	D10
●							Injection valves leaking, opening pressure too low	E 6
		●					Unequal fuel delivery (imbalance of fuel delivery)	F 1
●	●	●	●	●			Basic idle adjustment incorrect	F16
							The vacuum control for the warm-up regulator is defective	A18

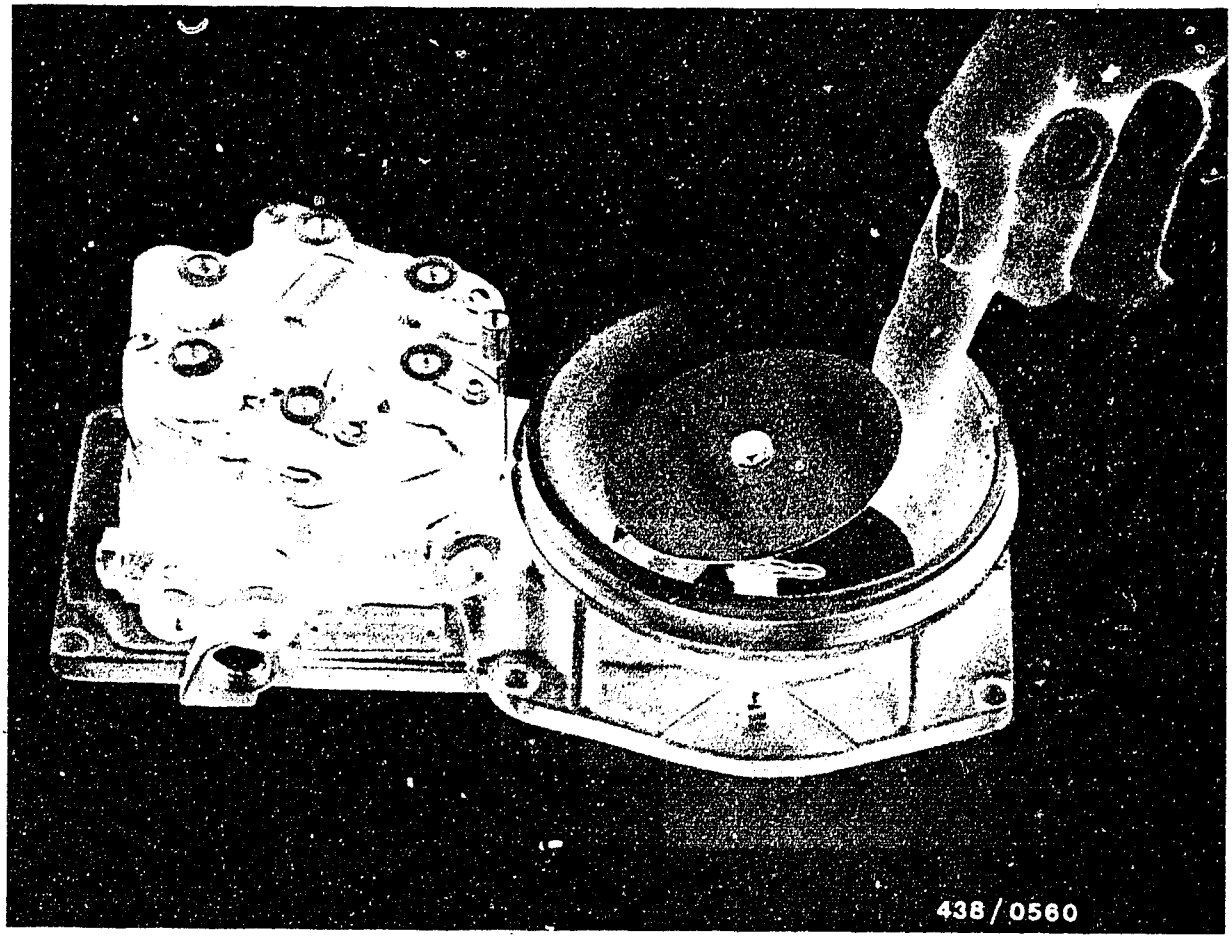


Working steps

8. Check the air-intake system of the engine for leaks.

The arrows in the diagram show typical points where leaks can occur.
Not to be seen in the picture but also to be checked: Seal on oil tank cover.
Check by performing a visual inspection or, in cases of doubt, as follows: Disconnect the hose from the outlet of the auxiliary-air device and blow air through this hose into the intake system using a compressed-air gun. The throttle valve is to be fully open. Brush connection points with soapy water, or spray with leak detector (e.g. Güpoflex).

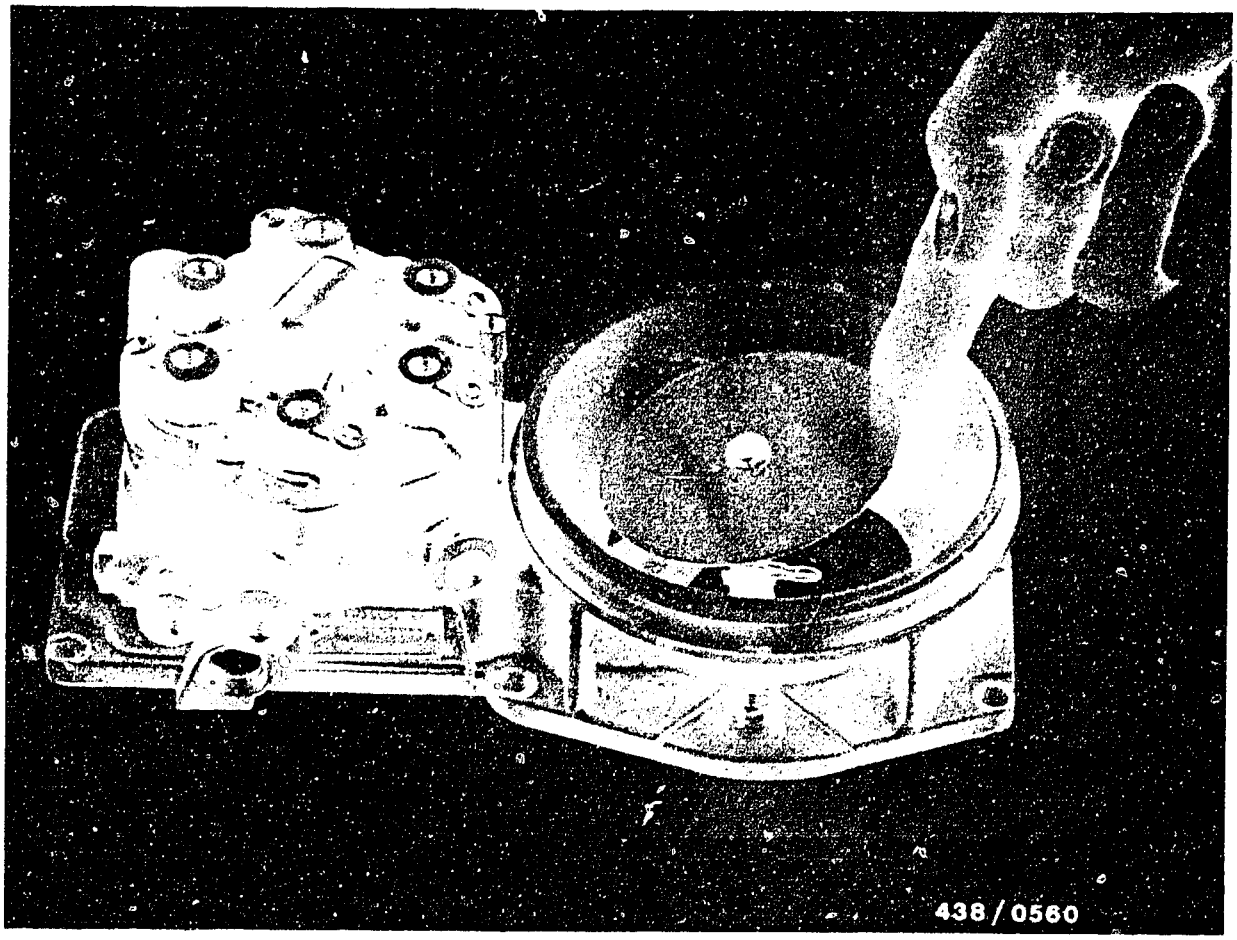
Under no circumstances may combustible liquids be used when testing for leaks.
The formation of bubbles or foam indicates a leak.
If a leak has been eliminated, it is necessary finally to adjust the idle speed with the engine at normal operating temperature: Idle-speed adjustment is described on Coordinates F 16.



9. Check the control lever in the air-flow sensor and the control plunger in the fuel distributor for ease of movement.

9.1 Preparations

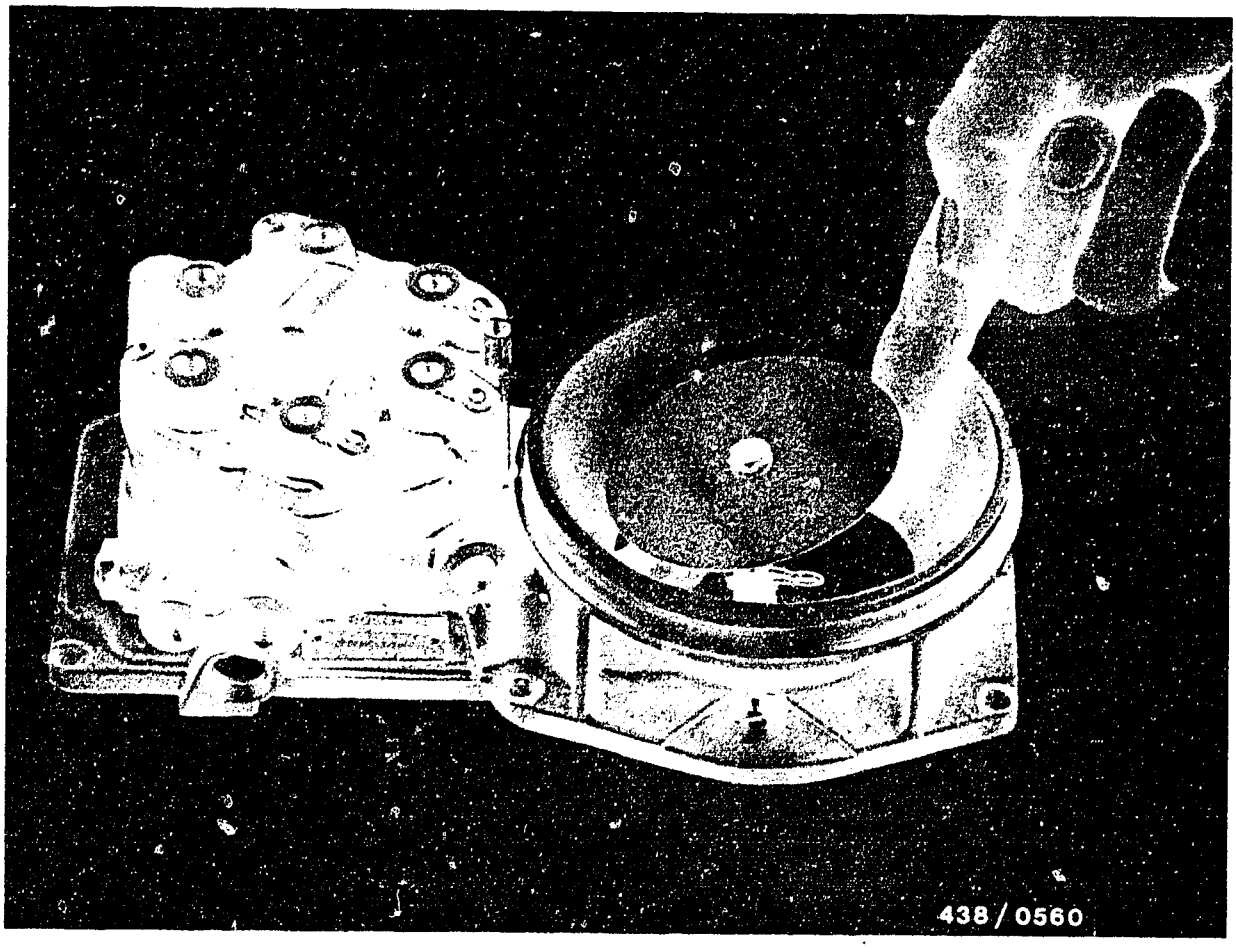
Engine temperature not below +20°C.
Remove the rubber hood between air-flow sensor and throttle-valve assembly so that the air-flow sensor plate becomes accessible.
Switch on the electric fuel pump for approx. 10 seconds by bridging the safety circuit.
This results in application of the control pressure to the control plunger in the fuel distributor.



9.2 Check that the control lever moves freely

Raise the air-flow sensor plate by hand and release again.
The sensor plate snaps back into the zero position and bounces up about twice from the spring-loaded stop.

If the control lever does not move freely, first release all fastening screws holding the air-flow sensor to determine whether housing deformation is the cause of the problem.
If the problem is solved by loosening the fastening screws, the seal between the air-supply housing and air-flow sensor should be changed (Porsche parts).
Tighten the screws uniformly cross-wise until springs are blocked together, then release again by one turn.
If the housing is not deformed, then the air-flow sensor must be repaired or replaced.



9.3 Check that the control plunger moves freely.

Raise the air-flow sensor plate by hand (updraft). The same resistance must be felt over the entire movement. Move the sensor plate rapidly back to a position just in front of the zero stop. The control plunger follows only sluggishly, but must make noticeable contact with the sensor plate lever. If this condition is fulfilled, the control plunger can be considered to move freely. If the control plunger does not move freely, remove the fuel distributor from the air-flow sensor.

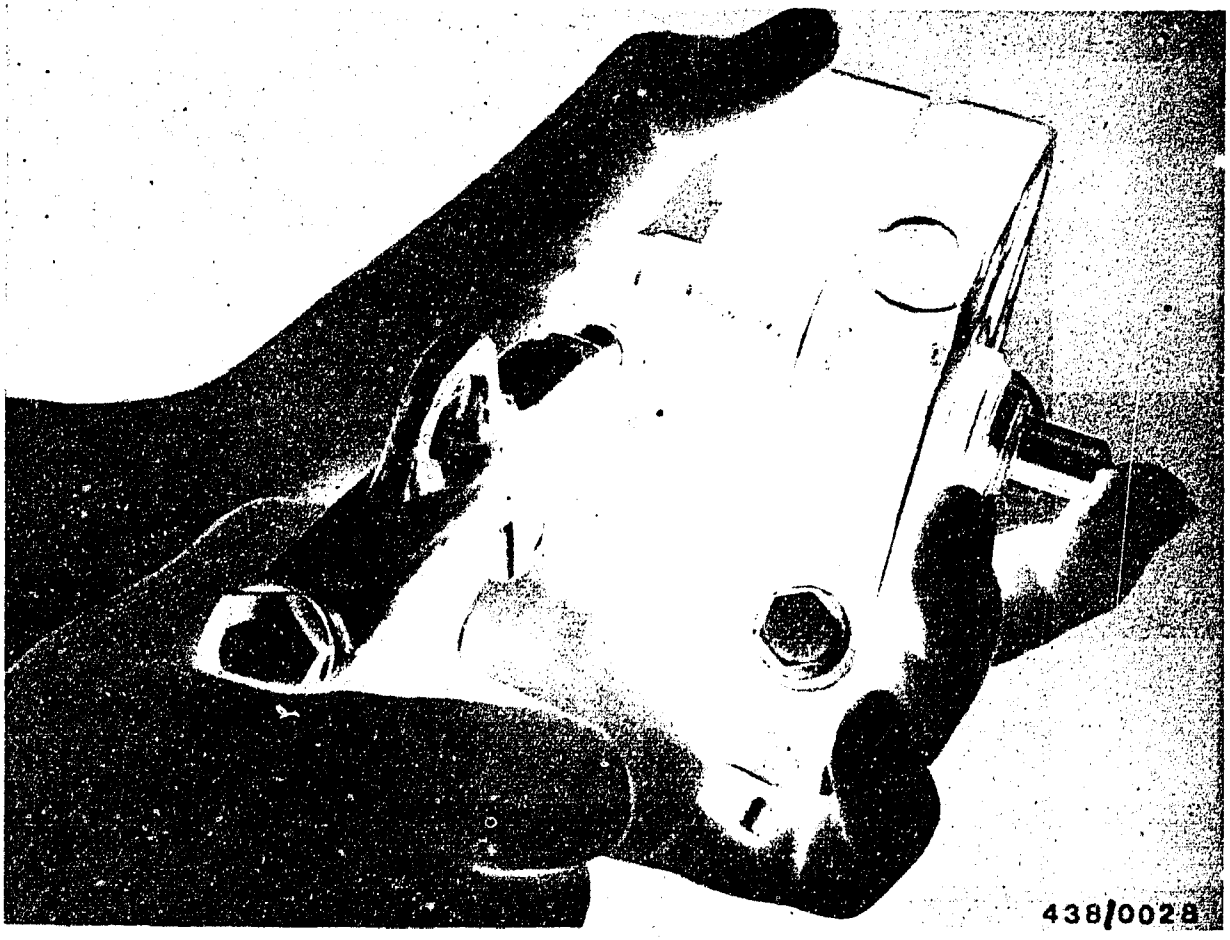
Important!

Note the following when installing fuel components and fuel lines:

Always ensure utmost cleanliness when loosening or tightening the fuel connections. No dirt must enter the fuel system.

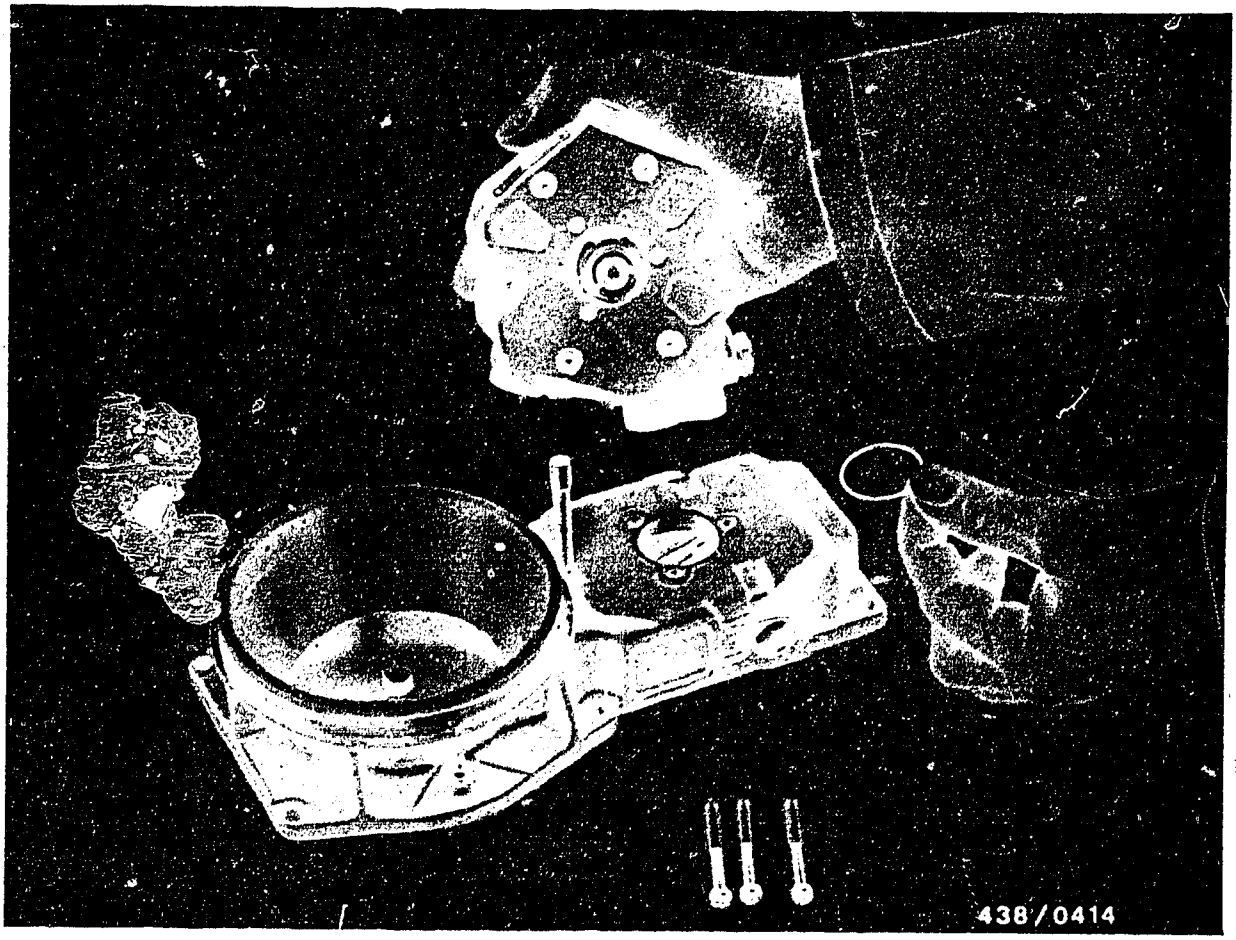
When loosening or tightening the fuel connections, apply counter-force at the fixed hexagon of the component.

Clean the fuel distributor thoroughly in the region of the fuel connections. Screw off all connections.



Screw out three fastening screws and remove the fuel distributor from the air-flow sensor.

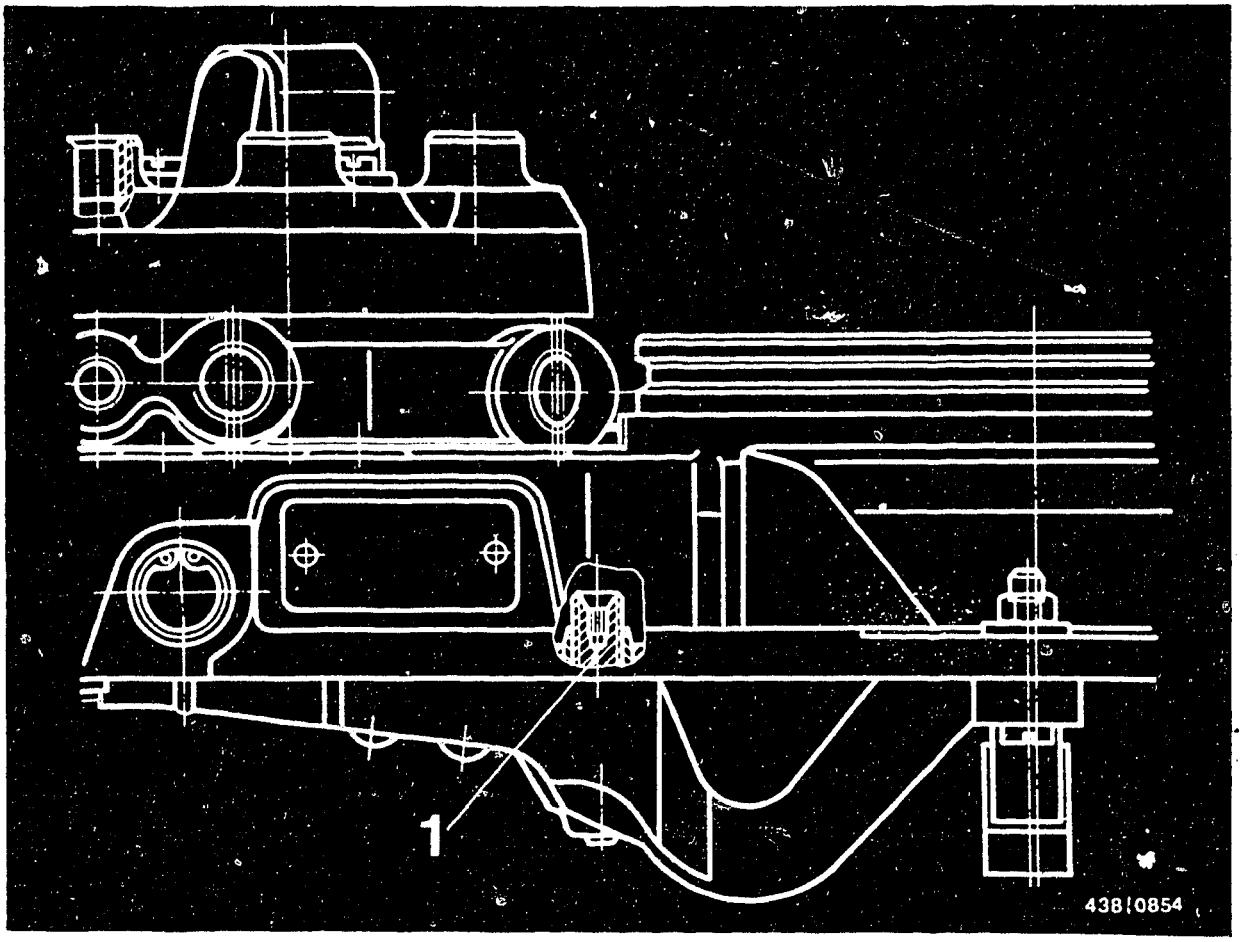
Remove the plunger. Under certain conditions, in order to do this it may be necessary to blow compressed air briefly against the plunger through the control-pressure connection hole. Hold the plunger with your hand while doing this. Clean the plunger thoroughly with benzine. If the plunger still does not move freely, replace the fuel distributor



9.4 Fitting the fuel distributor

When fitting the fuel distributor, use a new seal ring between fuel distributor and air-flow sensor. Observe the tightening torque 3.2...3.8 Nm (0.32... 0.38 kgfm) for the fastening screws precisely.

When connecting the fuel-injection tubing, use new seal rings.

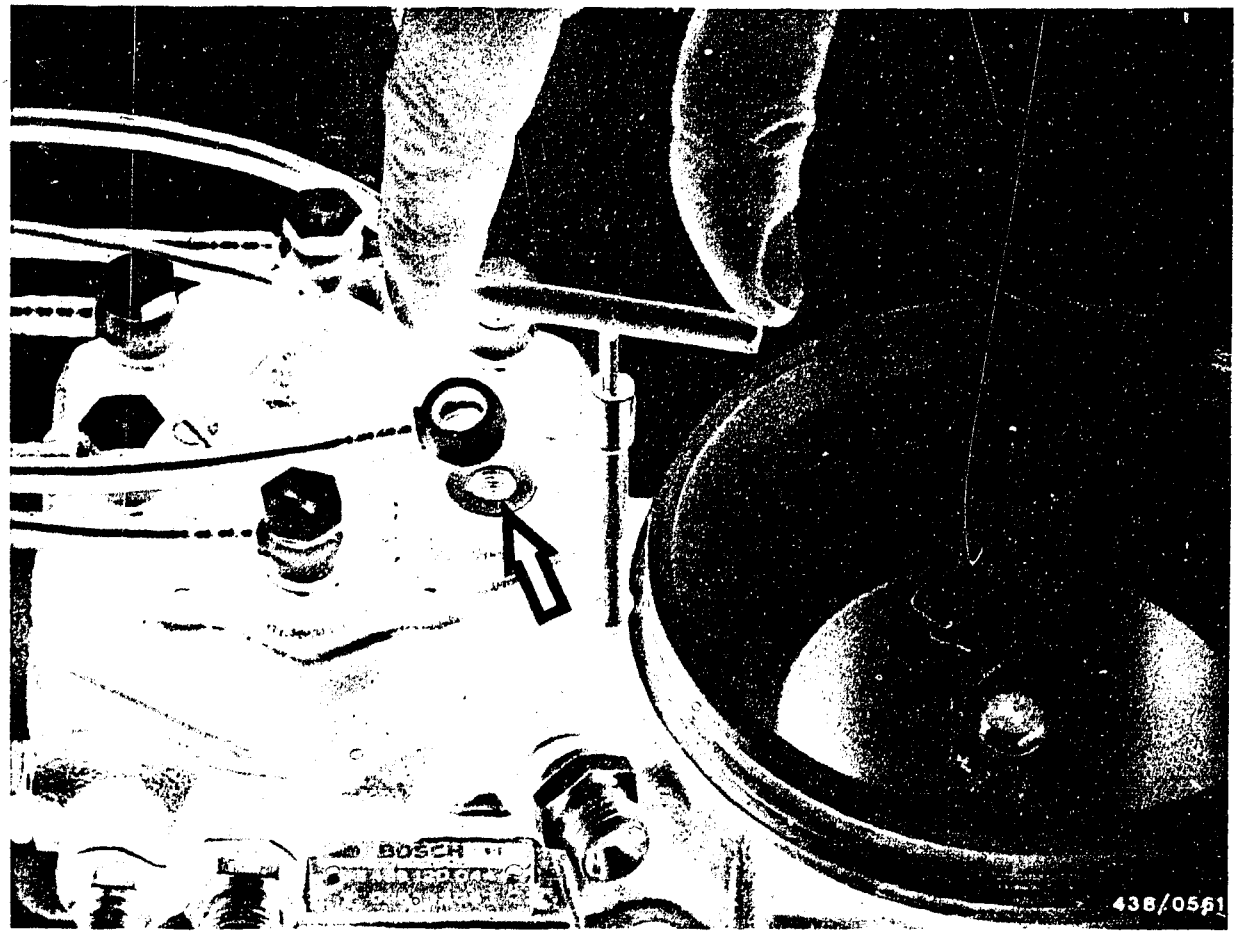


9.5 Matching the fuel distributor to the air-flow sensor for initial start

Unscrew an injection line on the fuel distributor.

Remove rubber plug of through-hole to idle-mixture-adjusting screw. Insert setting wrench KDEP 1035 through the hole into the idle-mixture-adjusting screw.

Bridge the electrical safety circuit so that the electric fuel pump operates.

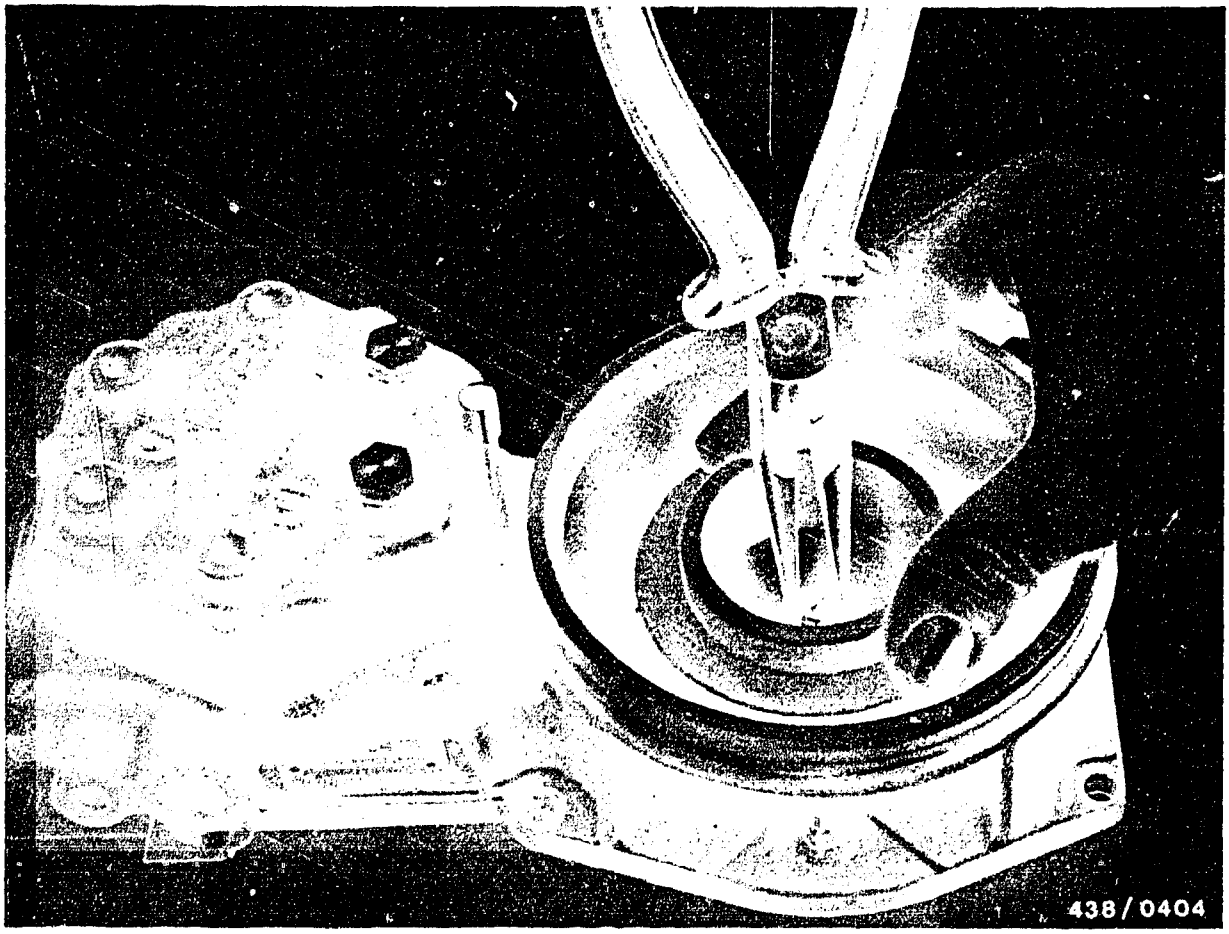


Screw in the idle-mixture-adjusting screw slowly and without exerting any great pressure on the adjusting wrench until fuel is just delivered from the open outlet (arrow) of the fuel distributor. Then turn back the adjusting screw by 1/2 turn.

Re-connect the fuel-injection line to the fuel distributor, start the engine and warm up.

The final matching of air-flow sensor and fuel distributor is carried out by adjusting the idle speed with the engine at normal operating temperature.

Idle-speed adjustment is described on Coordinates F 16.



10. Checking and adjusting the position of the air-flow sensor plate

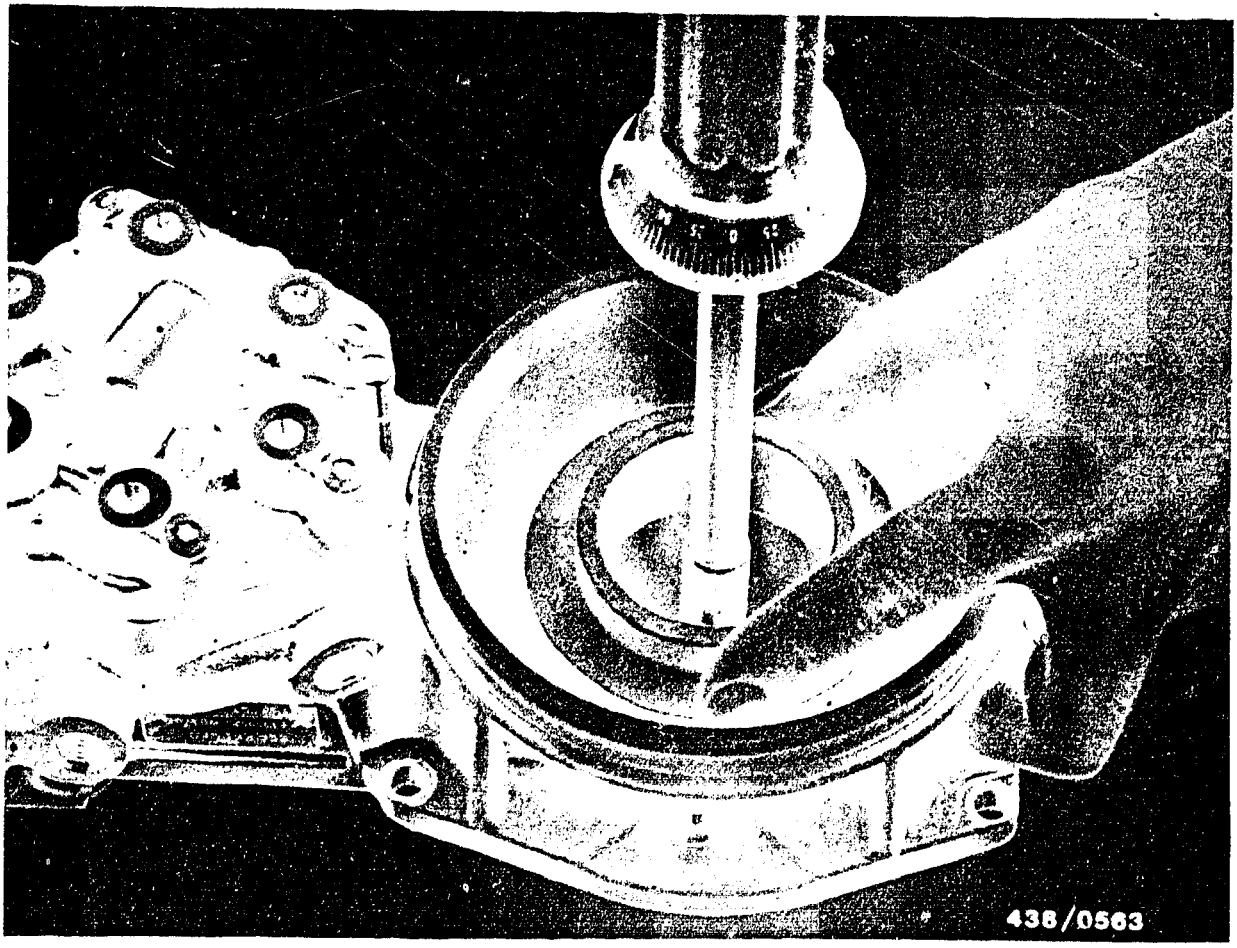
10.1 Preparations

- Engine temperature is not important
- Remove the rubber hood from the air-flow sensor (release 2 rubber bands), so that air-flow sensor plate becomes accessible.

10.2 Centering the air-flow sensor plate

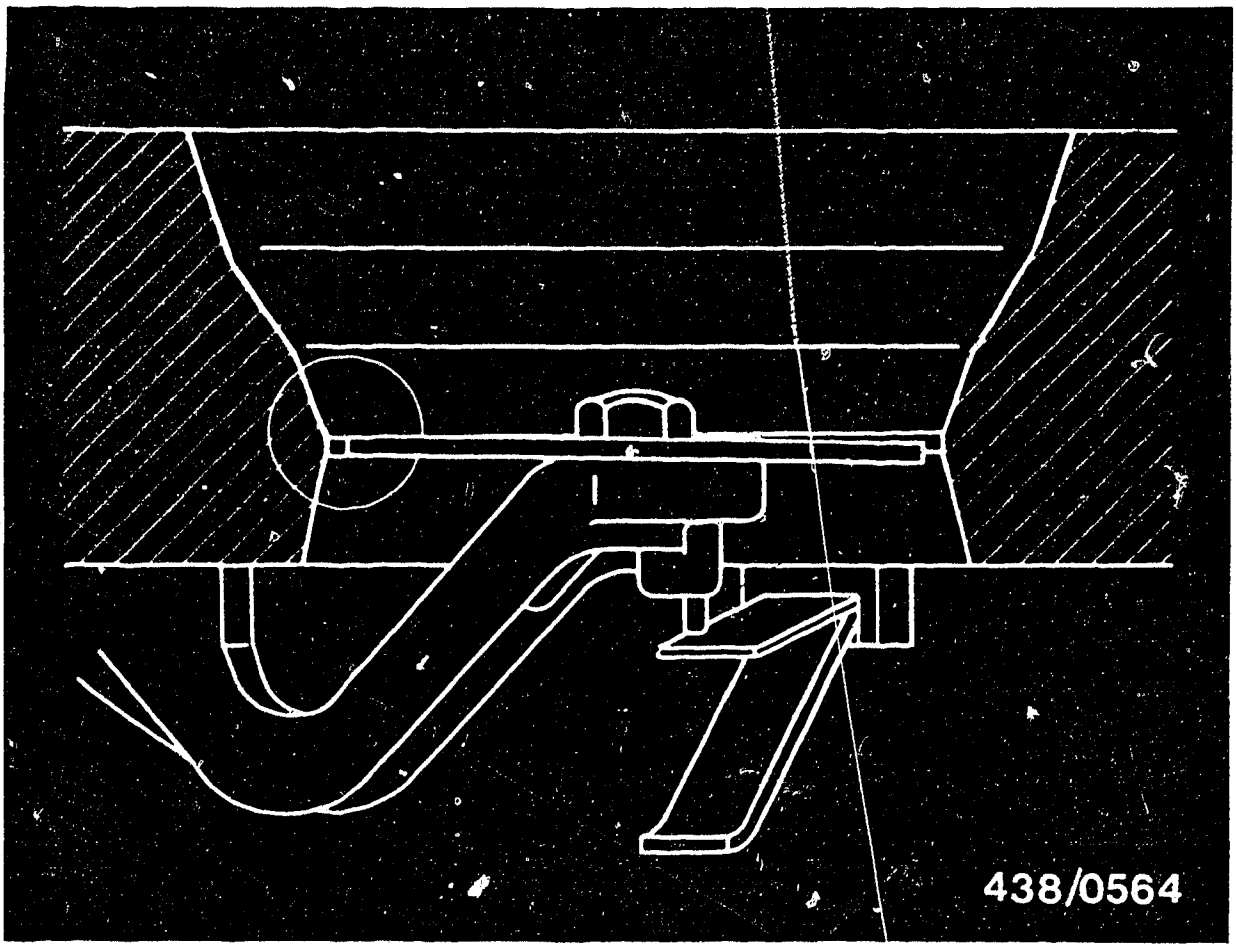
Check that the sensor plate is flat (not bent) and that it can move through the narrowest part of the air funnel without touching the funnel. If necessary, center it using a positioning ring KDEP 1040/10 (dia. 80 mm) as follows:

Loosen the sensor plate fastening screw. Insert the positioning ring while holding the fastening screw with pliers so that the sensor plate does not deflect downwards.



With the positioning ring in place, tighten the fastening screw with a torque of 5.0...5.5 Nm, loosen again and tighten again with the same torque.
When tightening the screw make sure that the air-flow sensor plate is in its zero position (in the cylindrical part of the air funnel).
It must no longer be possible to turn the air-flow sensor plate by hand.

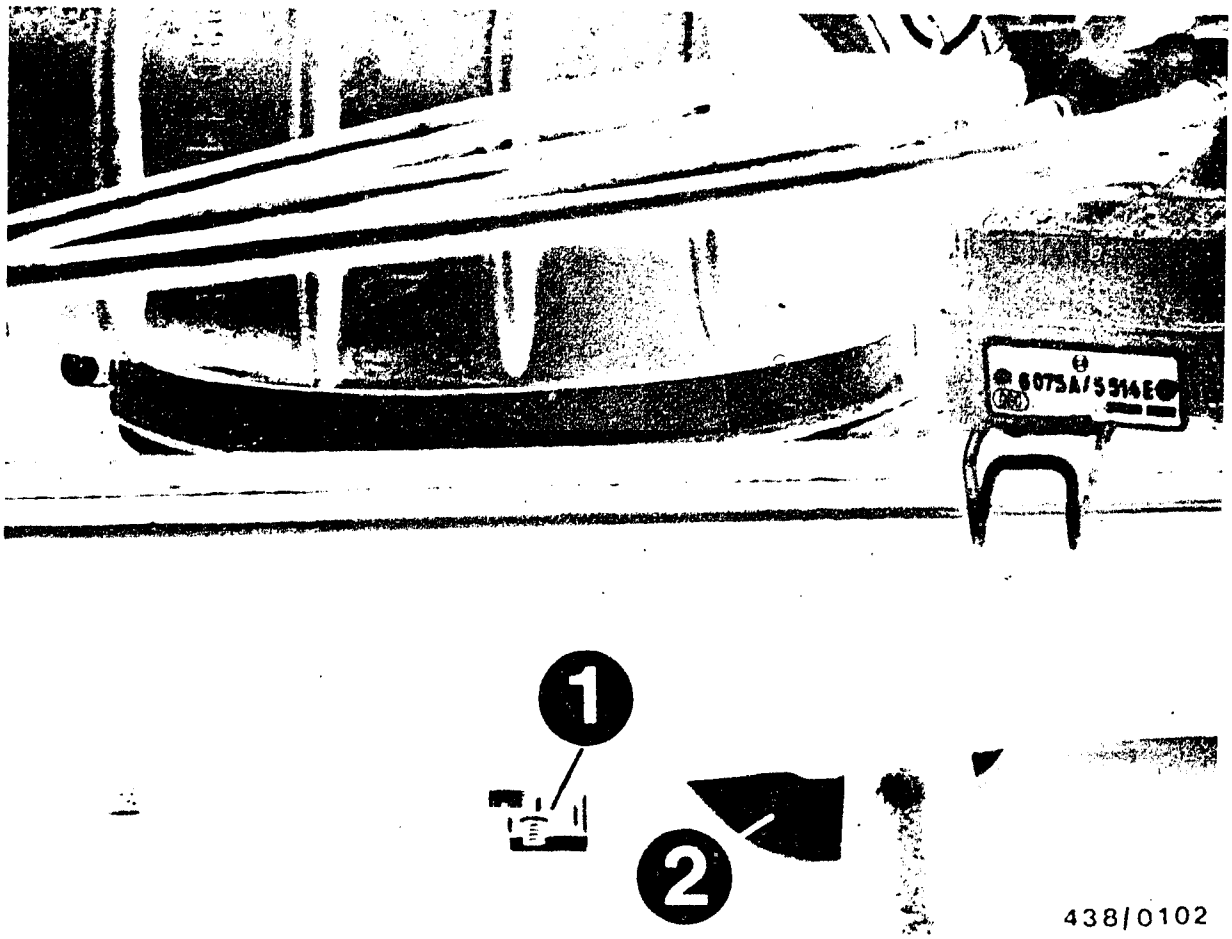
Caution:
The lower edge of the sensor plate is partially chamfered. In order to ensure that the sensor plate is correctly mounted, its upper side is identified either by the inscription "top" or by five punch marks in a row.



10.3 Checking and adjusting the zero position of the sensor plate (rest position):

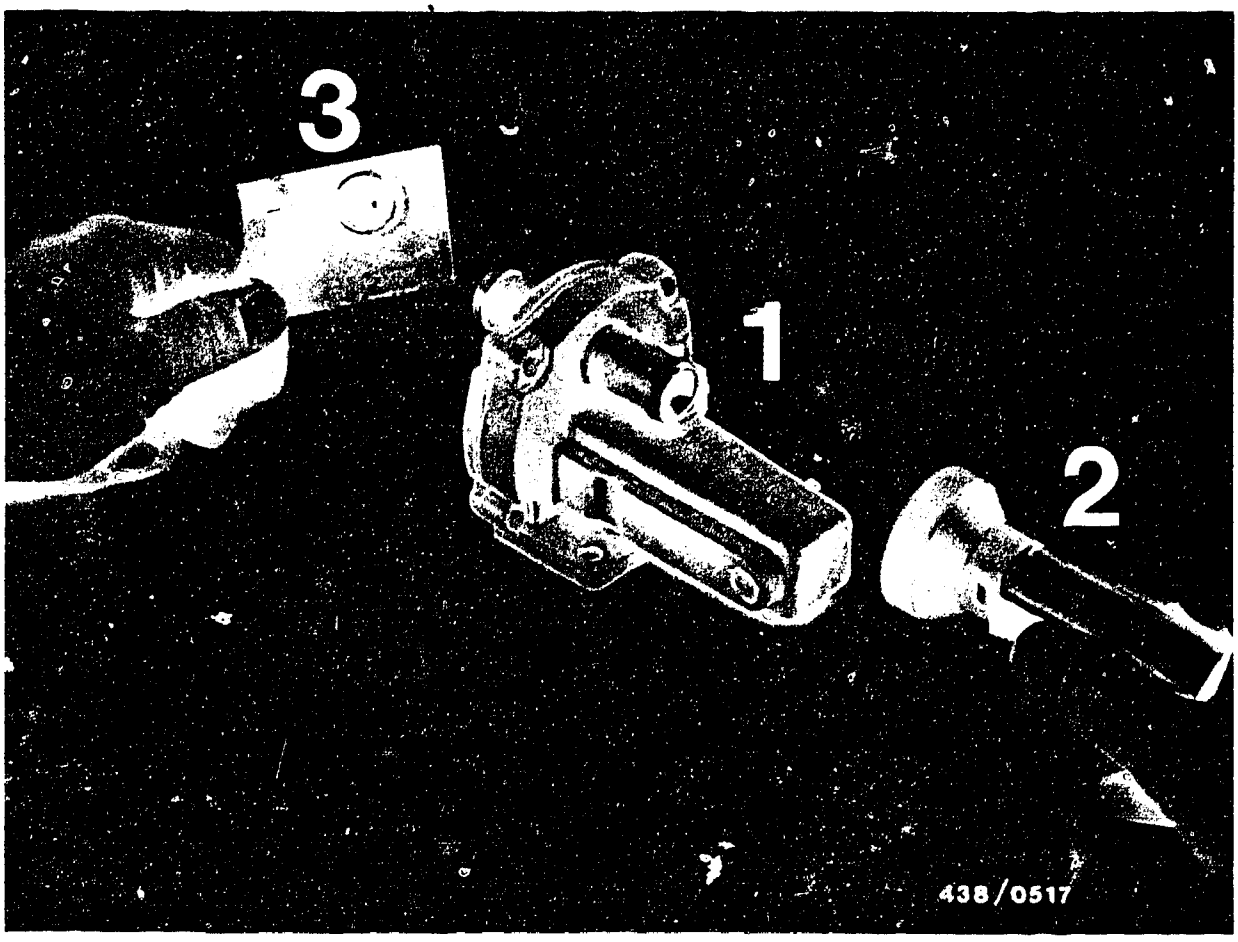
Switch on the electric fuel pump for approx. 10 seconds by bridging the safety circuit.
This results in application of the control pressure to the control plunger in the final distributor.

The upper edge of the sensor plate must be flush with the beginning of the cone in the position shown in the picture. A lower position of up to maximum 0.5 mm is permissible, however the air-flow sensor plate must not project at any point on its circumference outside the cylindrical part of the air funnel.



1 = Adjusting screw
2 = Control lever

Adjust the position of the air-flow sensor plate at the adjusting screw (instead of the usual shaped spring) on the stop bracket. Tighten the lock nut of the adjusting screw after each adjustment.



1 = Auxiliary-air device
2 = Flashlight
3 = Mirror

11. Checking the operation of the auxiliary-air device.

The engine must be cold.
Disconnect the electric cable plugs from the auxiliary-air device and warm-up regulator.
Disconnect both air hoses from the auxiliary-air device.
Since the two hose fittings on the auxiliary-air device are located exactly opposite each other, a visual check can now be made to see if the blocking plate is partially open.
It will be easier to look through the auxiliary-air device with the aid of a flashlight and a mirror, as shown in the illustration.

- If an opening is not visible with the engine cold, replace the auxiliary-air device.

- Fit the electric cable plug on the auxiliary-air device.

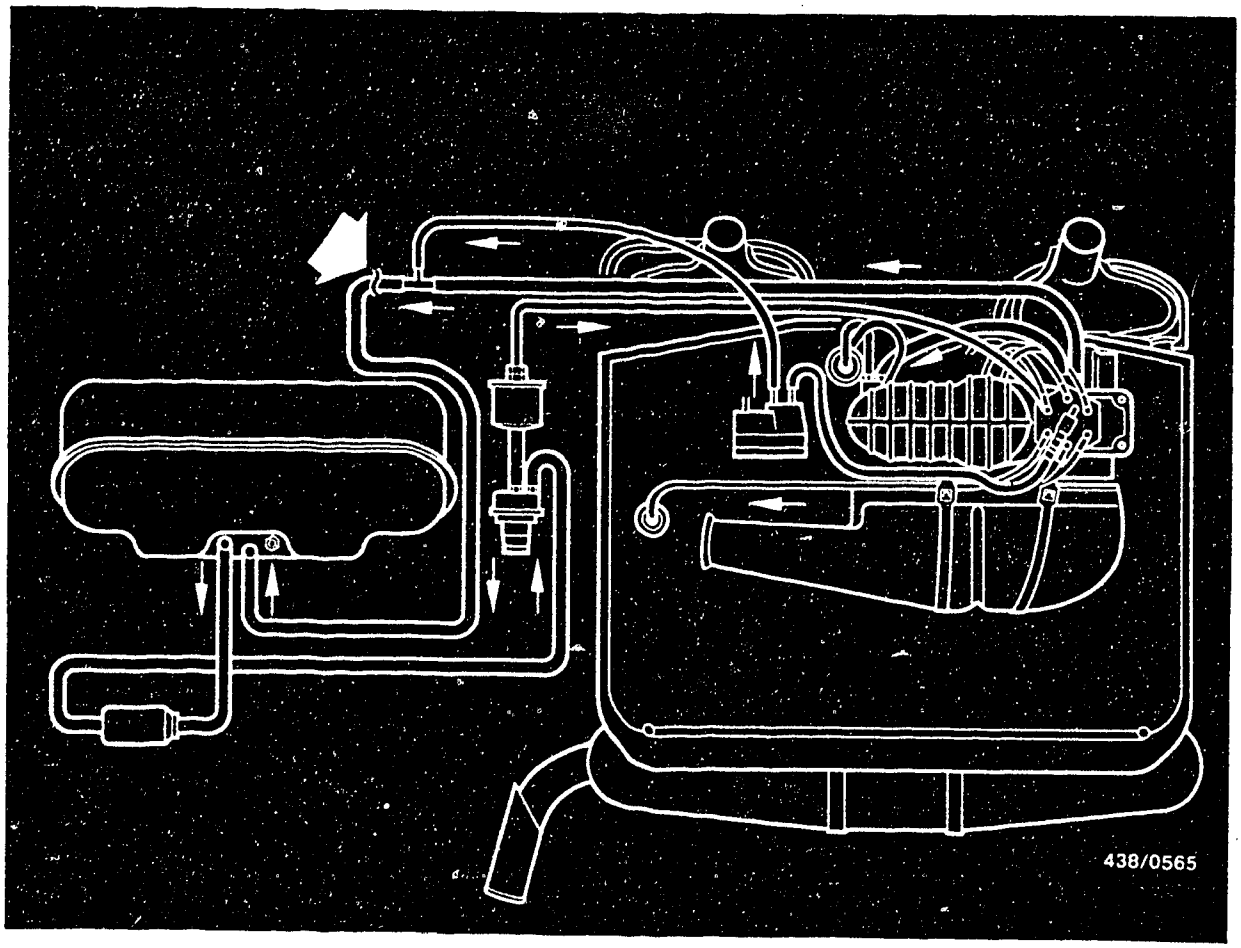
- By bridging the electrical safety circuit, supply power to the auxiliary-air device.
  After a maximum of 10 minutes, the opening in the auxiliary-air device must be completely closed by the blocking plate.

- If the blocking plate does not close, check the power supply (open circuit, voltage drop).
  Minimum voltage across the connector 11.5 V with the engine stopped.

- If these points are O.K., check the heating coil of the auxiliary-air device for an open circuit using an ohmmeter.

- Replace the auxiliary-air device if defective.

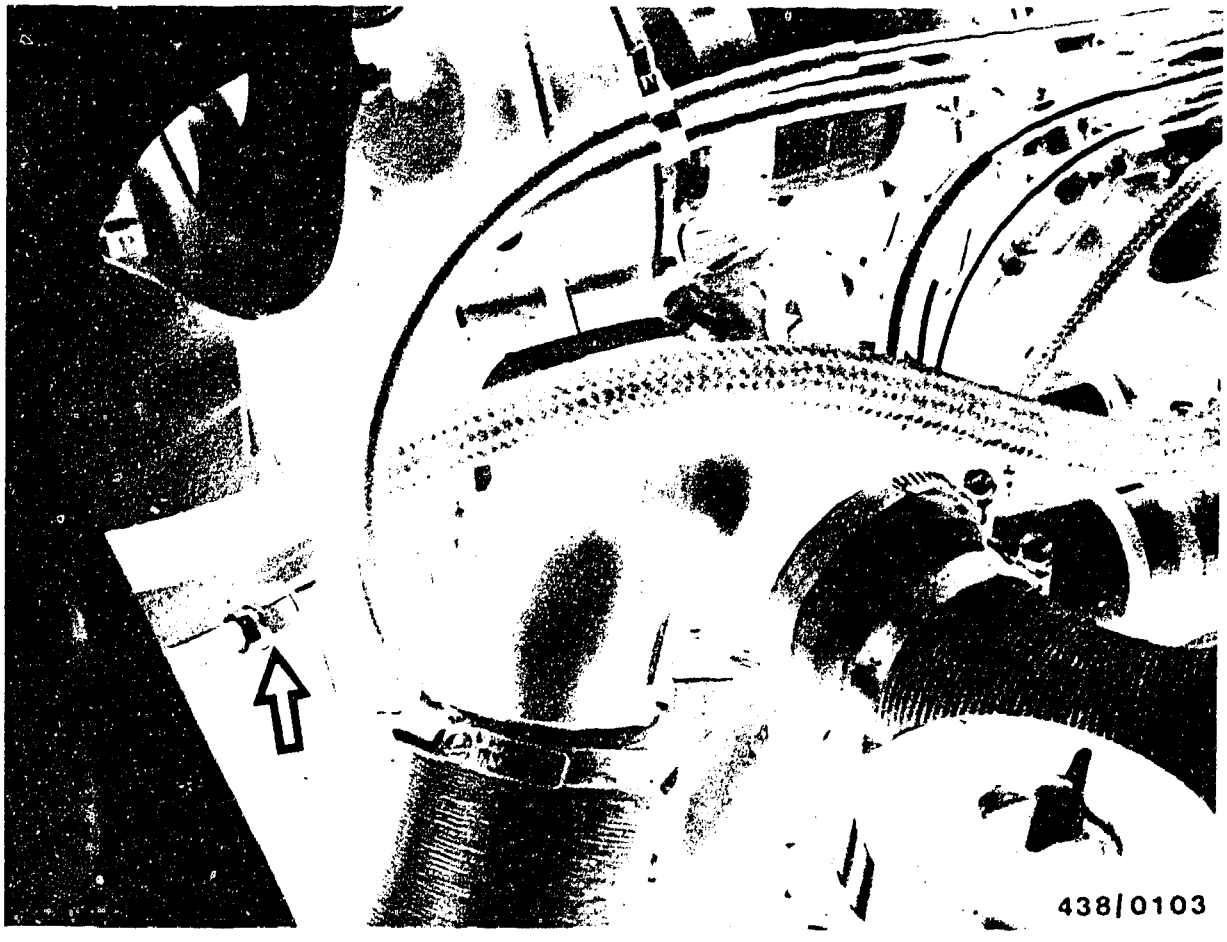
When the auxiliary-air device has been replaced, readjust the idle speed with the engine at normal operating temperature. Idle adjustment is described on Coordinates F 16.



12. Checking the operation of the electric fuel pump.

12.1 Requirement

Conclusive information on the operation of the electric fuel pump can only be given by a measurement of fuel delivery under pressure, i.e. under primary (system) pressure. This measurement must therefore be made at the return line leading to the fuel tank (arrow).



12.2 Measuring point

The measuring point for fuel-delivery testing is the screw connector in the fuel return line (arrow). Undo the connector and connect the test hose to the end of the line fastened by a bracket.
Hose nipple on test hose with male thread M 14x1.5 and 60° internal taper.

12.3 Testing

Since the measurement is performed with the engine stationary, switch on the electric fuel pump while testing by bridging the electrical safety circuit.

12.3 Checking

Pull off the plug from the warm-up regulator and auxiliary-air device. Switch on the electric fuel pump for 30 seconds by bridging the safety circuit and collect the fuel delivered in a graduate.

12.4 Test specifications

Fuel delivery: at least 1000 cm^3/30 seconds.

12.5 Possible causes of insufficient fuel delivery

- Power supply to the electric fuel pump defective, voltage drop. Minimum voltage at terminal with pump operating: 11.5 V.

- Fuel filter very dirty.

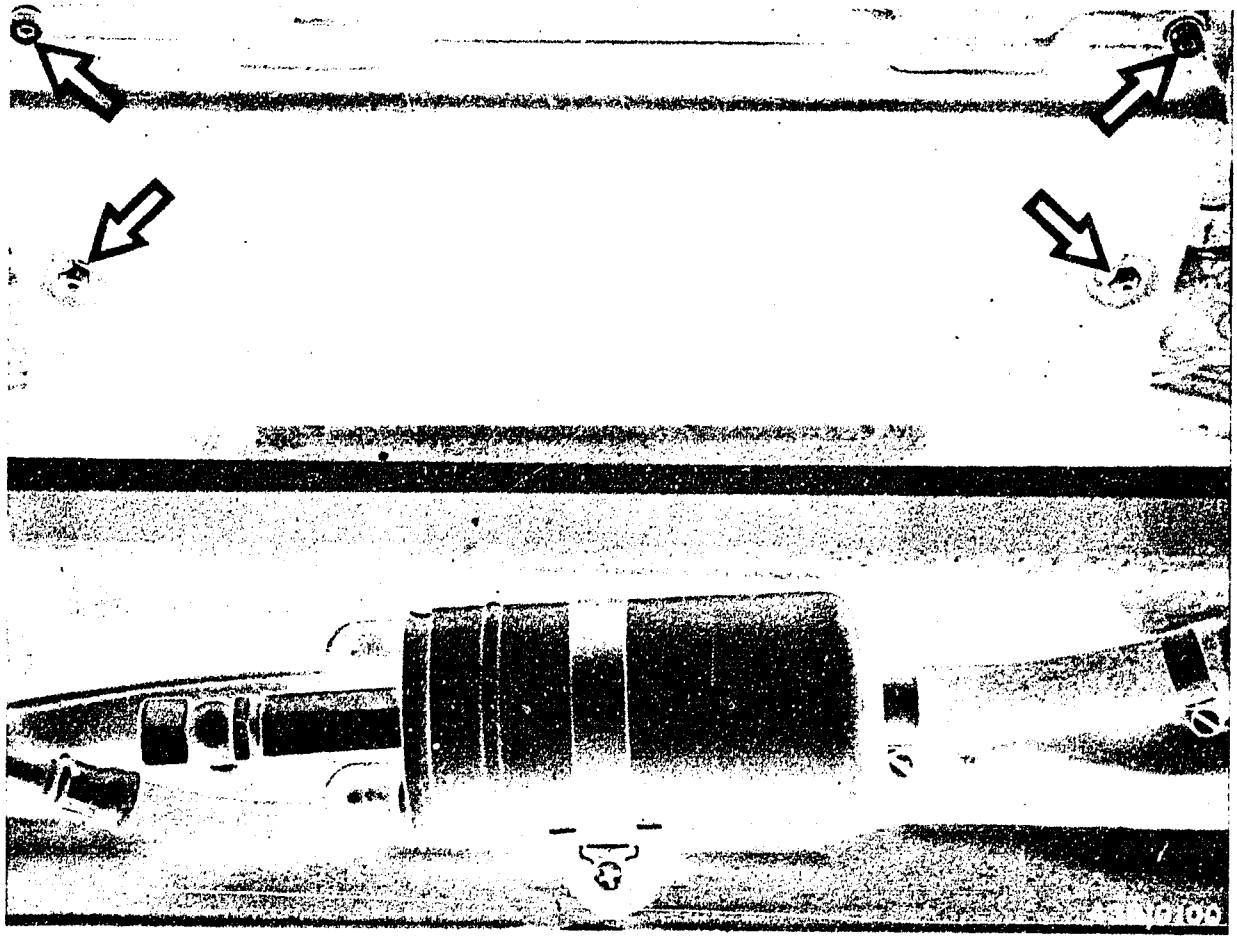
If these points are O.K., the fault lies in the electric fuel pump itself.
Replace the electric fuel pump.

12.6 Removal and installation of electric fuel pump

Note:
The 1976 model was equipped with the electric fuel pump of Type EKP I (with side delivery fitting).

As of the 1977 model use was made of the version EKP IV (with aluminium housing and central intake and delivery fittings).

The installation position is identical for both types.

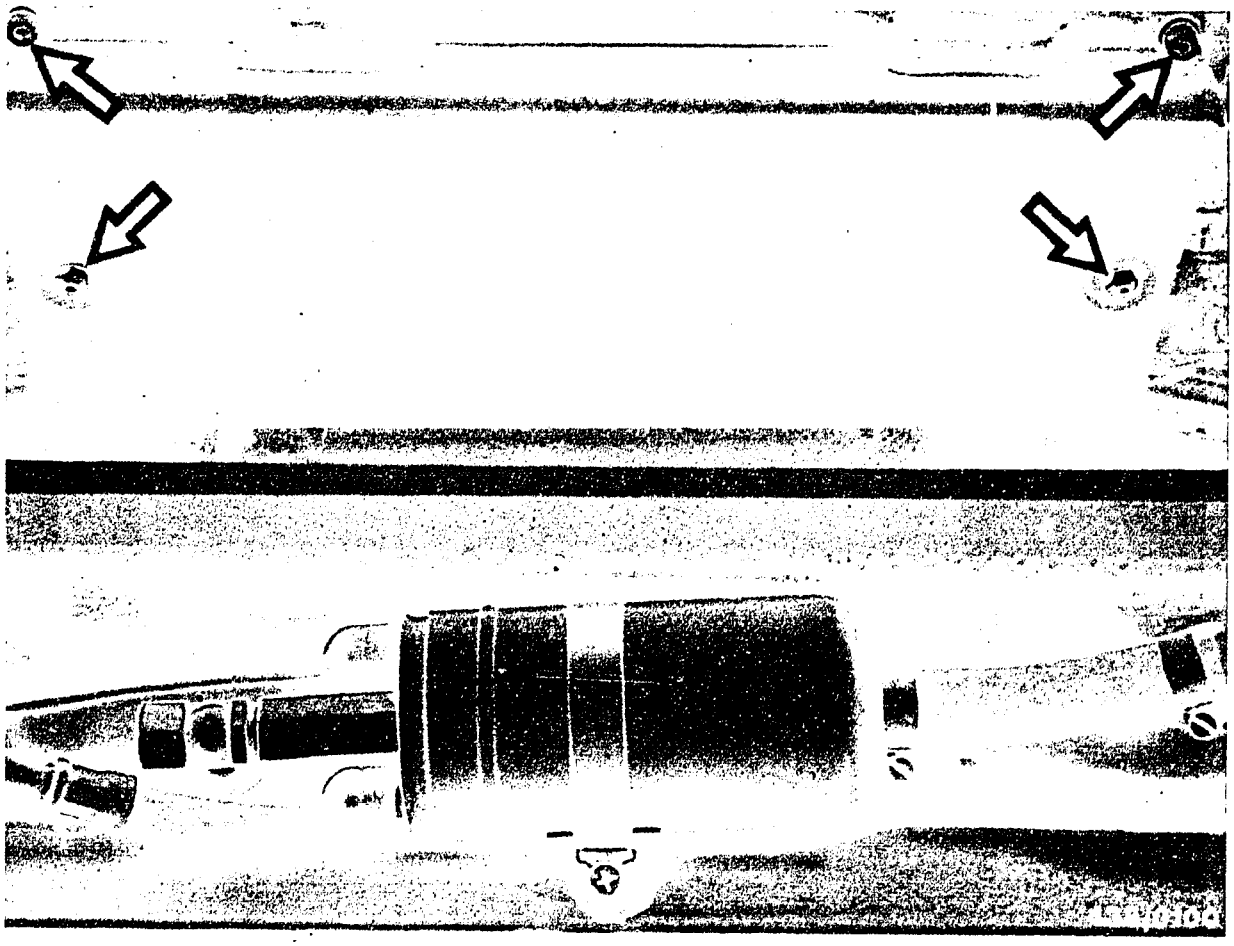


Remove the dirt-deflector plate from the front-axle auxiliary support (unscrew 2 hexagon-socket-head cap screws and 2 nuts).
Pinch off the intake hose before loosening (e.g. using hose clamper W 157 from Matra Co.) so that no fuel can escape.
Remove the delivery line and the electric terminals, loosen the clamping band and remove the pump.

When installing, make sure that the pump does not touch the fuel tank, front-axle auxiliary support or body.
Connect the delivery line with new seal rings.
Re-fit the dirt-deflector plate.

Note: When connecting the delivery line to the side connection of EKP I, be sure to use new seal rings of the specified version (part number 1 580 203 002).

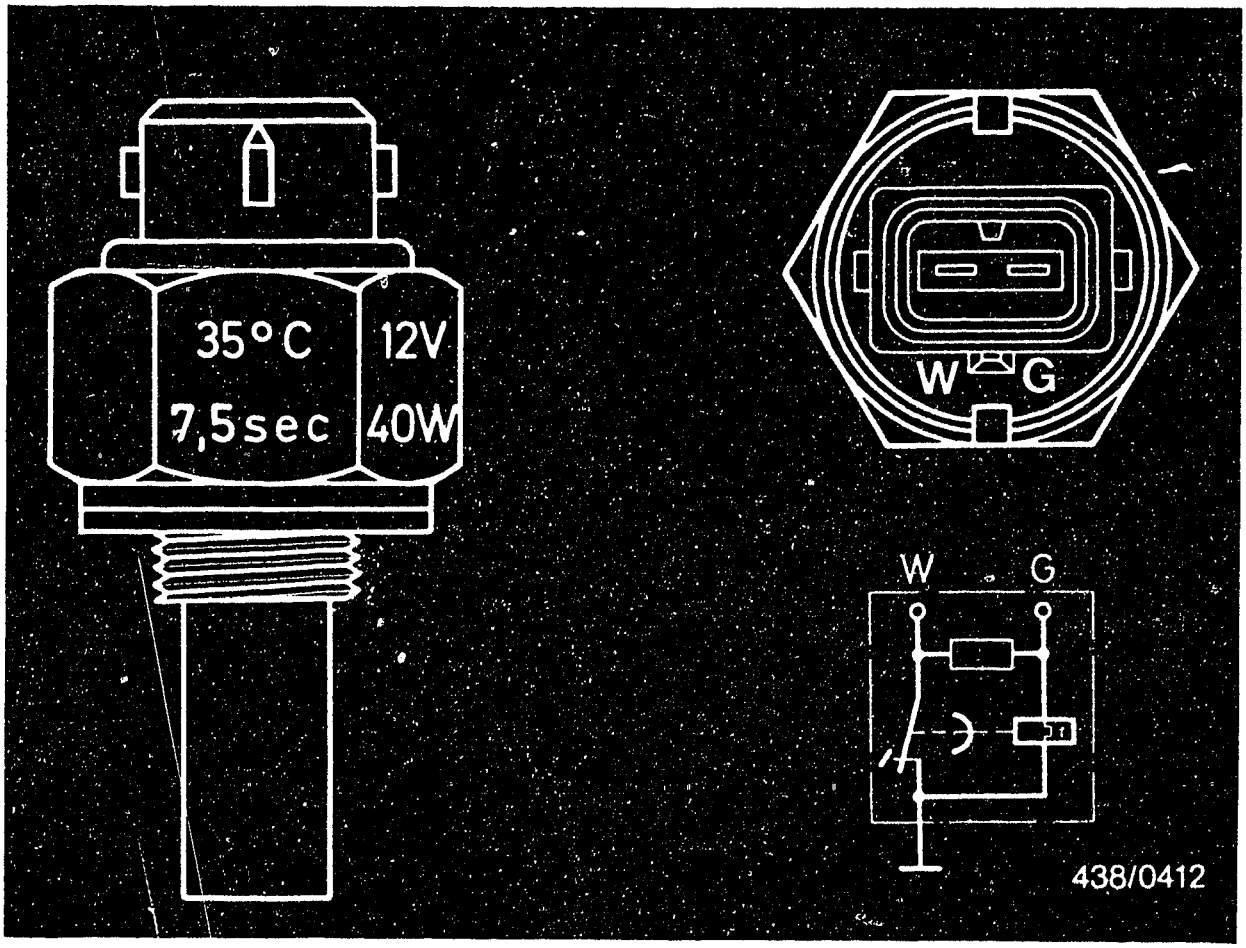
Observe tightening torque for inlet-union screw (1.6...2.3 Nm).



Caution:

The fastening screws and nuts are at the same time fastening elements for the front-axle auxiliary support and the anti-roll bar.
Therefore, when fitting the dirt-deflector plate, be sure to observe the specified tightening torques for the screws and nuts.

Hexagon-socket-head cap screws = 47 Nm (4.7 kgfm)
Self-locking nuts = 28 Nm (2.8 kgfm)
After the nuts have been removed several times they will lose their self-locking characteristic (nuts can easily be turned).
Therefore, if necessary, use new self-locking nuts.



13. Checking the cold-starting system (thermo-time switch, start valve).

13.1 Thermo-time switch:

The thermo-time switch must be removed for testing.

It is located in the engine block below the secondary-air pump/ignition distributor. It may be necessary, for improved accessibility, to remove the ignition distributor.

The thermo-time switch used in the Porsche 911 and Carrera models (non-Bosch product) has a switching temperature of 35°C and a switching time at -20°C of 7.5 seconds. Both values are stamped into the hexagonal section of the thermo-time switch.
The removed thermo-time switch is tested using the ohmmeter in accordance with the specifications given below.
The temperatures for the thermo-time switch can easily be obtained with water.

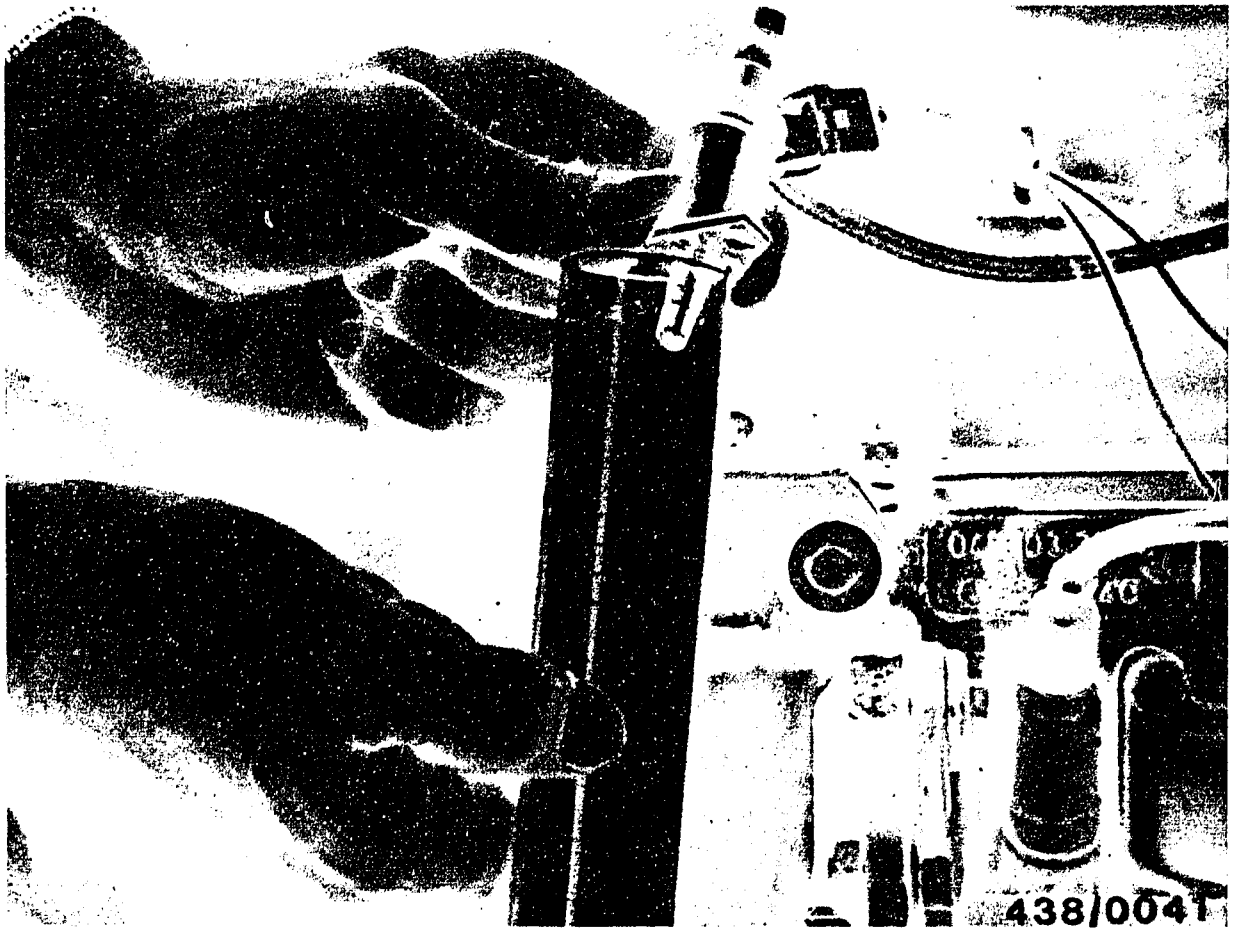
Resistance measurement (Ω) between

at a temperature below °C	above °C	Term. "G" and "ground" (housing)	Term. "W" and "ground" (housing)	Term. "G" and "W"
+ 30		25...40 Ω	0 Ω	25...40 Ω
	+40	50...80 Ω	100...160 Ω	50...80 Ω

13.2 Start valve

Remove the start valve for testing. It is fitted on the rear side of the intake housing below the throttle-valve assembly. For removing and installing it is advisable to use a mirror so that the connections and fastening screws can be seen.

The fuel line (polyamide line) remains connected for testing.



Pull off the plug and connect the start valve directly to ground and to terminal 15 (e.g. at the ignition coil) using connecting cable KDJE 7450/70.

Important note:
During this test, do not let the connecting cable touch B +. Danger of fire due to sparking!
Hold the start valve in a suitable container (e.g. the graduate).

Switch on the electric fuel pump by bridging the safety circuit.
Switch on the ignition (max. 30 seconds). The start valve must now open and spray fuel.

Switch off the ignition, remove the electric connecting cable and dry the nozzle of the start valve.
The safety circuit remains bridged so that the primary pressure is applied to the start valve.
No droplets of fuel must drip from the nozzle of the start valve during the next minute. Even if shaken and knocked, the start valve must not leak.
Then switch the electric fuel pump off again.
Replace the start valve if it does not open or if it leaks.

If a leaky start valve or a defective thermo-time switch has been replaced, it is necessary finally to adjust the idle speed with the engine at normal operating temperature.
Idle-speed adjustment is described on Coordinates F 16.

14. Checking the control pressures

14.1 Preliminary remarks:

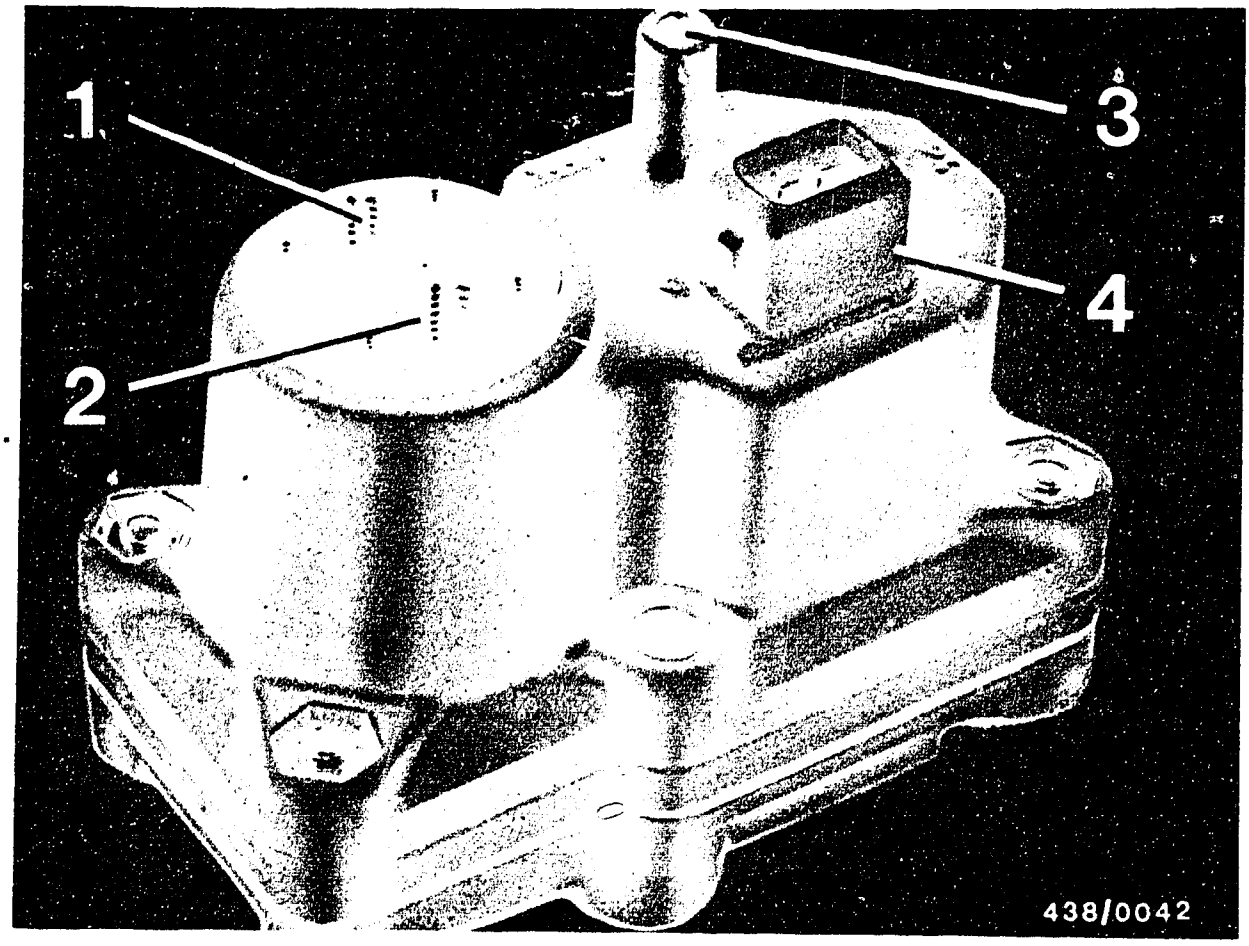
The control pressures tested in the following are in each case governed by the warm-up regulator.
If the test results are incorrect, however, this may also be due to faults which have nothing to do with the warm-up regulator.

These possible faults are:

- No or too low a voltage at the electric connector.
- Fuel return from the warm-up regulator blocked or constricted.
- Too high a fuel delivery for the control-pressure circuit.

The testing of this control-pressure delivery is described as an additional test step at the beginning of the control pressure tests.
Test specification: 160...240 cm^3/min.

Reference is made to the other possible causes of trouble in the respective test step.

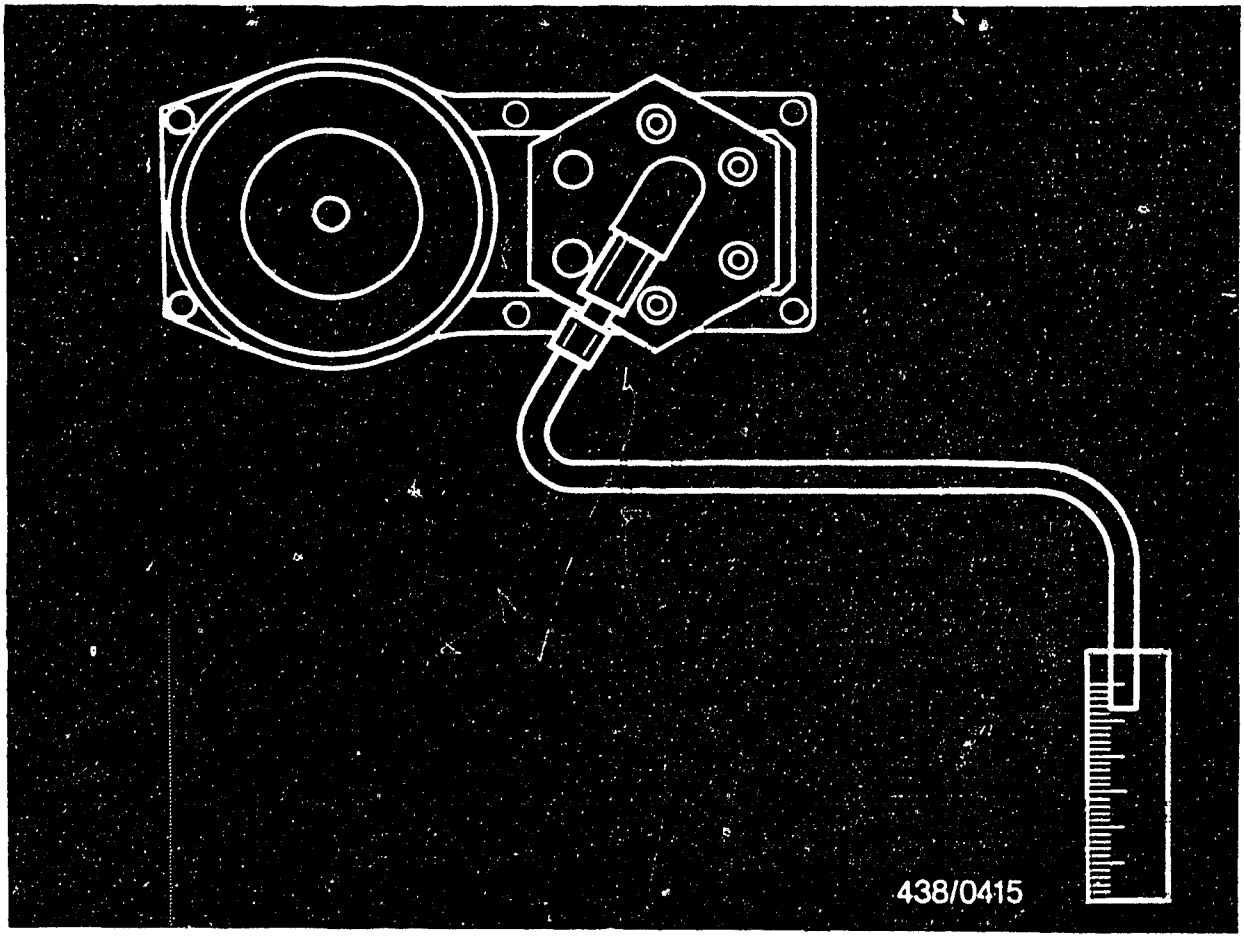


1 = Return connection (M 8 x 1)
2 = Inlet connection (M 10 x 1)
3 = Connection for intake-manifold pressure (downstream of throttle valve)
4 = Electric connection

14.2 Warm-up regulator versions

- Warm-up regulator No. 0 438 140 017,... 033.

The warm-up regulator is a version for intake-manifold-pressure-controlled full-load enrichment. This means that the cold and warm control pressures are additionally influenced by the intake-manifold pressure acting on the full-load diaphragm of the warm-up regulator. The intake-manifold connection port (3) is on the top of the housing cover.



14.3 Checking the fuel delivery for the control-pressure circuit:

Before testing: Make sure that the electric fuel pump is operating properly.

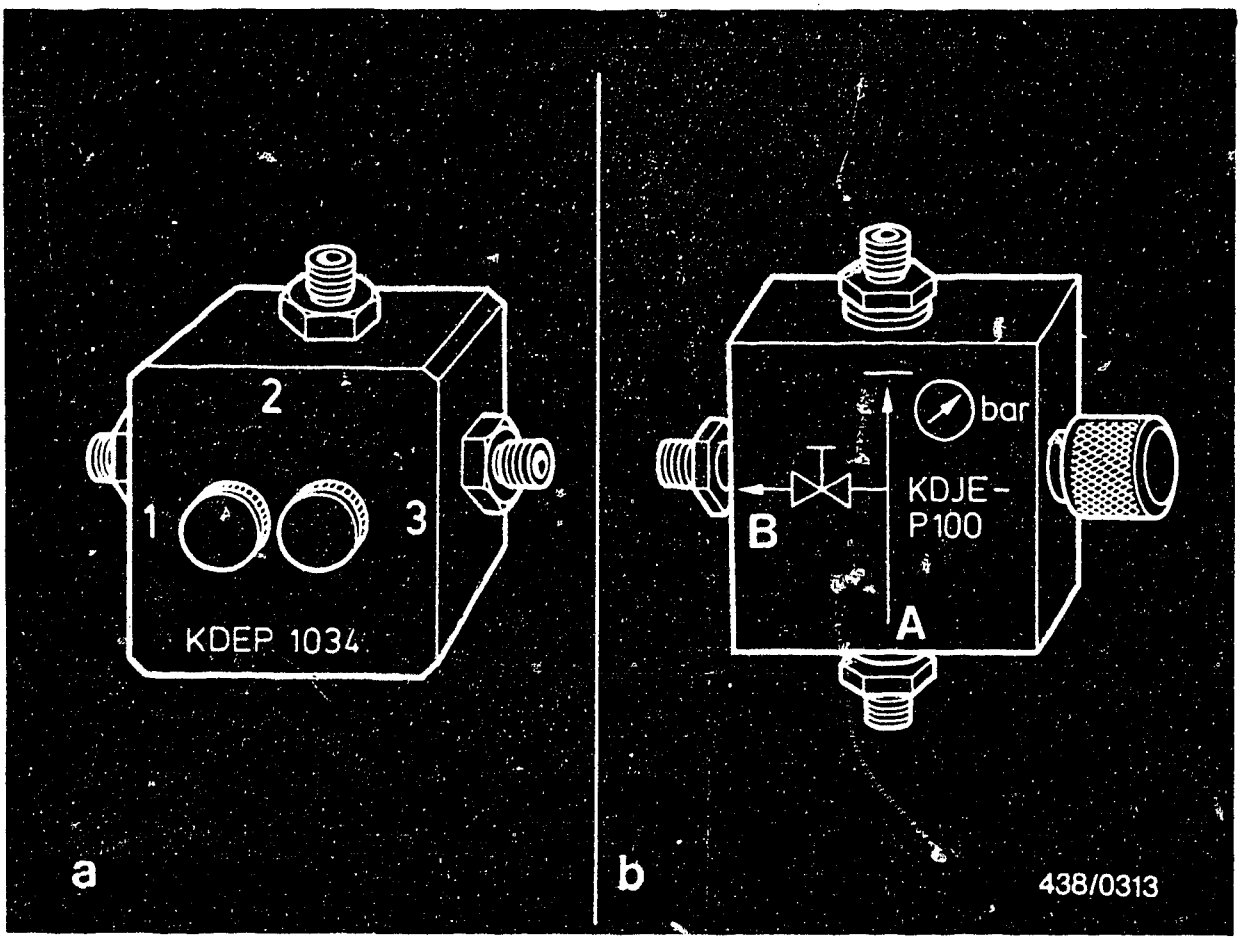
Unscrew the control-pressure line (to the warm-up regulator) from the fuel distributor.

Screw connecting piece (thread M 8 x 1/M 12 x 1.5) from connecting parts set KDJE-P 100/10 onto control-pressure port. Connect one of the two connecting hoses of the pressure tester KDJE-P 100 (previously KDEP 1034) to the connecting piece on the fuel distributor (thread M 12 x 1.5) and hold hose in graduate (approx. 0.5 litre capacity).

Switch on the electric fuel pump for 1 minute by bridging the safety circuit.
Measure delivery.

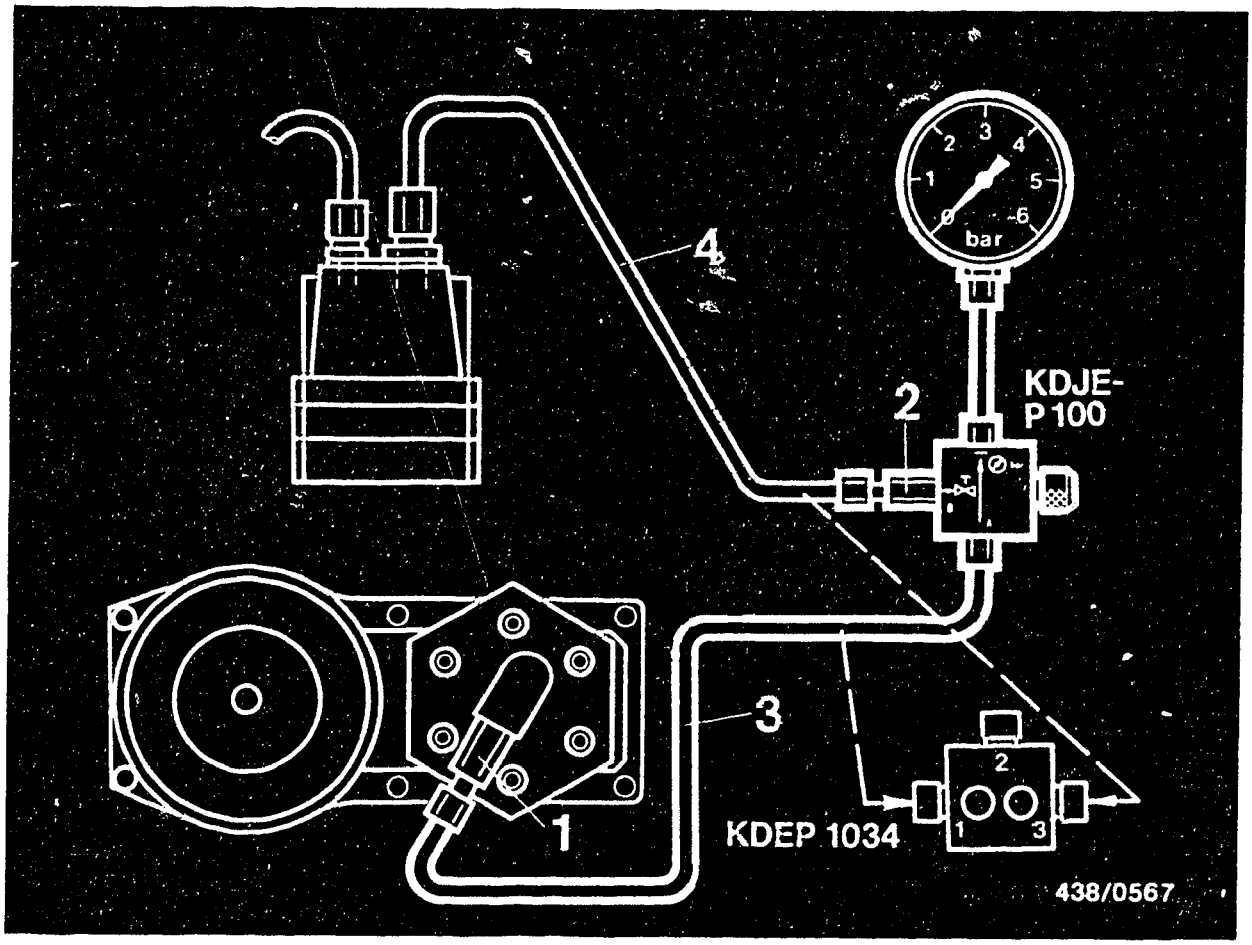
Test specification: 160...240 cm^3/min.

If the measured value is outside tolerance, the fault is in the fuel distributor.
Replace the fuel distributor.



14.4 Mounting the pressure tester KDJE-P 100 (formerly KDEP 1034):

The pressure tester KDEP 1034 is equipped with a three-way valve with 2 separate valve screws. The connections of the directional-control valve are numbered (Fig. a). Since the end of 1979 the pressure tester KDJE-P 100 has been supplied. Its directional-control valve has only one valve screw (Fig. b). The connections of this directional-control valve are identified by symbols:
A = Inlet (from the fuel distributor)
B = Outlet (to the warm-up regulator)
Caution:
When the directional-control valve is not in use, always keep the valve screw(s) open in order to relieve the pressure on the seal rings.



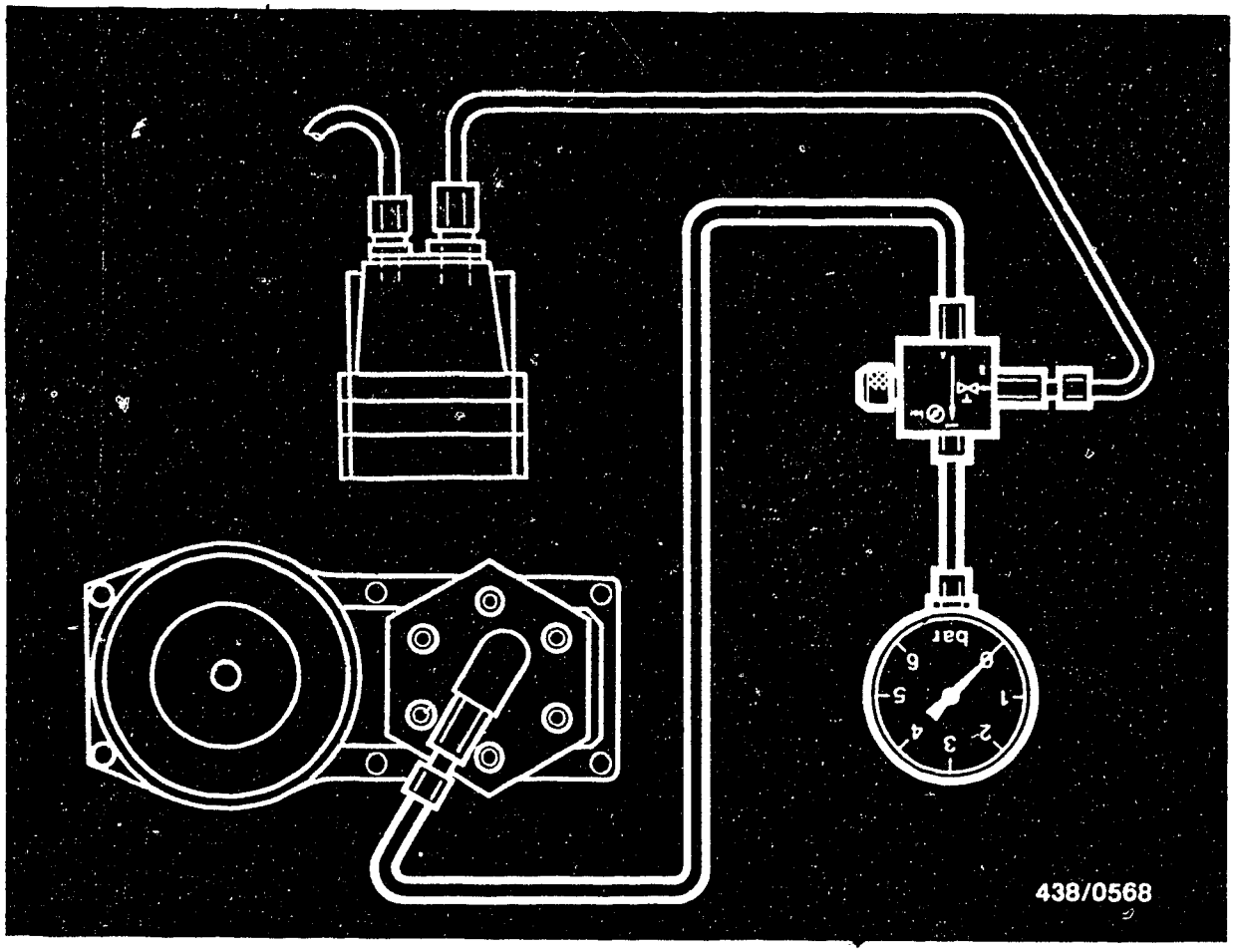
The directional-control valve of the pressure tester is connected into the control-pressure line from the fuel distributor to the warm-up regulator.

The connecting-parts set KDJE-P 100/10 is required.

Screw the adapter of connecting-parts set with seal ring onto connection port B or 3 of the directional-control valve (2).

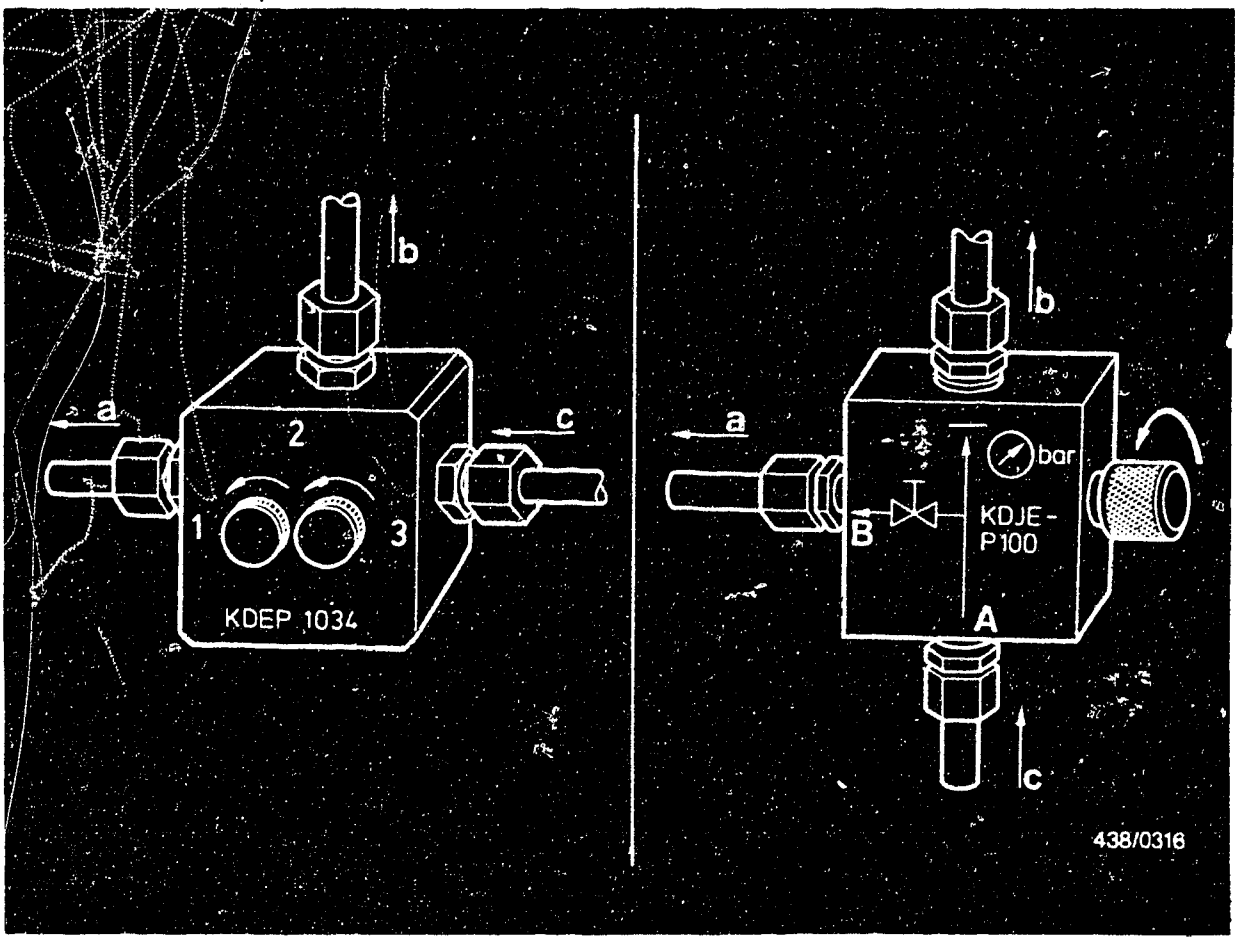
Unscrew control-pressure line (to the warm-up regulator) from the fuel distributor and connect it to the adapter (4).

Screw the connecting piece of the connecting-parts set to the control-pressure connection port of the fuel distributor (1) and connect it with connection port A or 1 of directional-control valve via connecting hose (3).



14.5 Bleeding the pressure tester:

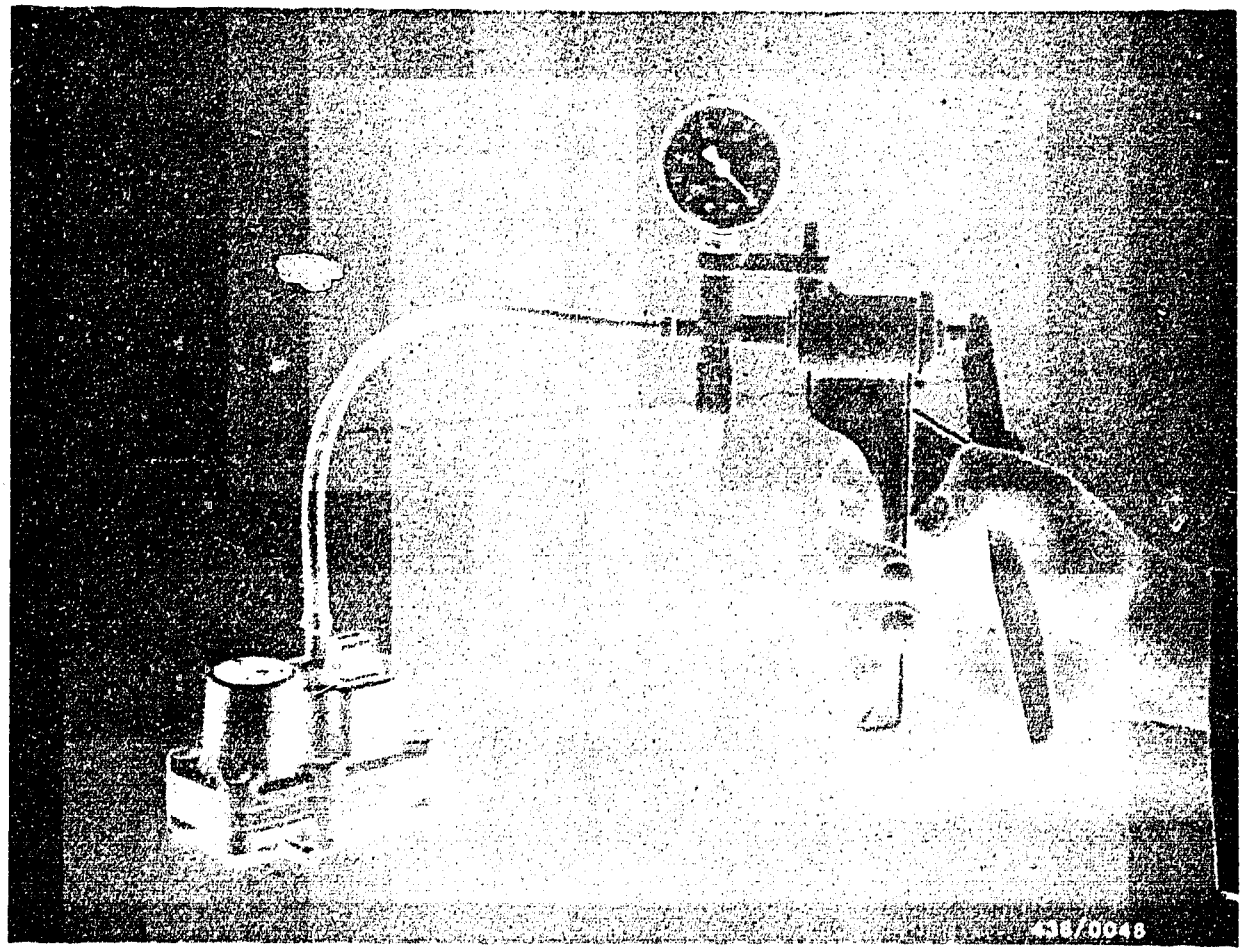
Disconnect the electric plug from the warm-up regulator and the auxiliary-air device.
Let the pressure gauge hang down (hose fully extended).
Switch on the electric fuel pump by bridging the electrical safety circuit:
Open and close the valve screw of the directional-control valve (valve screw 3 in the case of KDEP 1034) in a 10-second rhythm about 5 times. Then hang the pressure gauge from a suitable support (e.g. from one of the struts under the engine hood).
Open valve screw of directional-control valve (both screws in the case of KDEP 1034) (turning to the left).



a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

14.6 Testing the "cold" control pressure:

The test is performed with the engine switched off.
The engine must be cold. For this purpose, the engine should have been switched off for several hours, preferably overnight.
Pull off the plug from the warm-up regulator.
Open the valve screw of the directional-control valve (both screws in the case of KDEP 1034).
Switch on the electric fuel pump by bridging the electrical safety circuit.
The pressure gauge now indicates the "cold" control pressure.



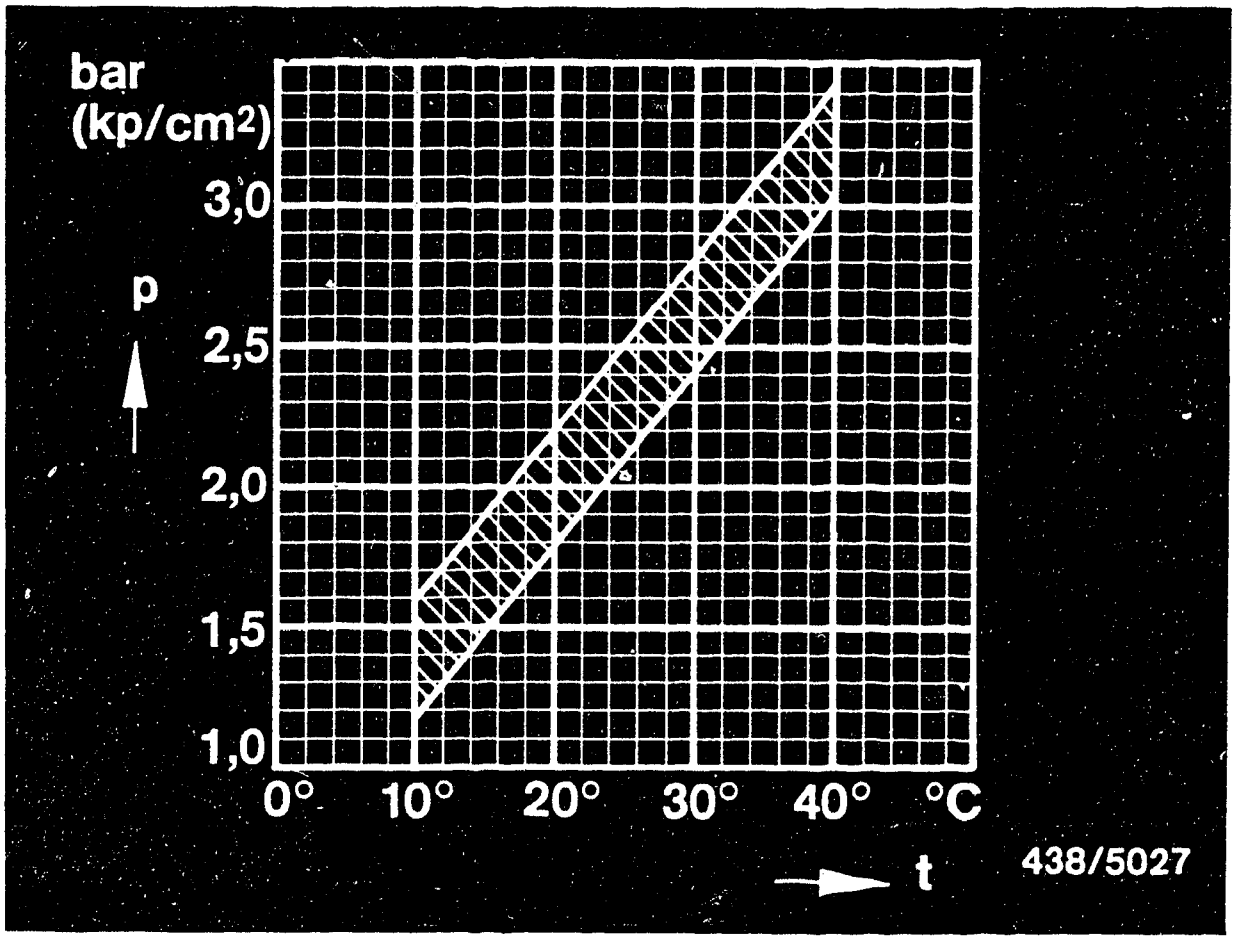
Part No. of warm-up regulator: 0 438 140 017
0 438 140 033

The control pressure is checked with simulated intake-manifold pressure, i.e. vacuum is applied to the warm-up regulator.

To do this, connect the vacuum pump to the intake-manifold-pressure connection port of the warm-up regulator on the top of the housing. The picture shows testing with the recommended Mityvac hand vacuum pump.

Setting value for testing: 520...546 mbar
(390...410 mmHg)

The "cold" control pressure is indicated on the pressure gauge of the pressure tester.



p = Control pressure (bar or kgf/cm^2 gauge pressure)
t = Ambient temperature (^{o}C)

Warm-up regulator Part No.: 0 438 140 017
0 438 140 033

Calculate the nominal control pressure in accordance with the ambient temperatures in the graph.

Example: Ambient temperature = 20^{o}C
Nominal control pressure = 1.8...2.2 bar gauge pressure

If the measured "cold" control pressure differs from the nominal value, this may be due to one of the following faults:

- Fuel delivery for the control-pressure circuit too low or too high. Test fuel delivery.
  Test value: 160...240 cm^3/min.

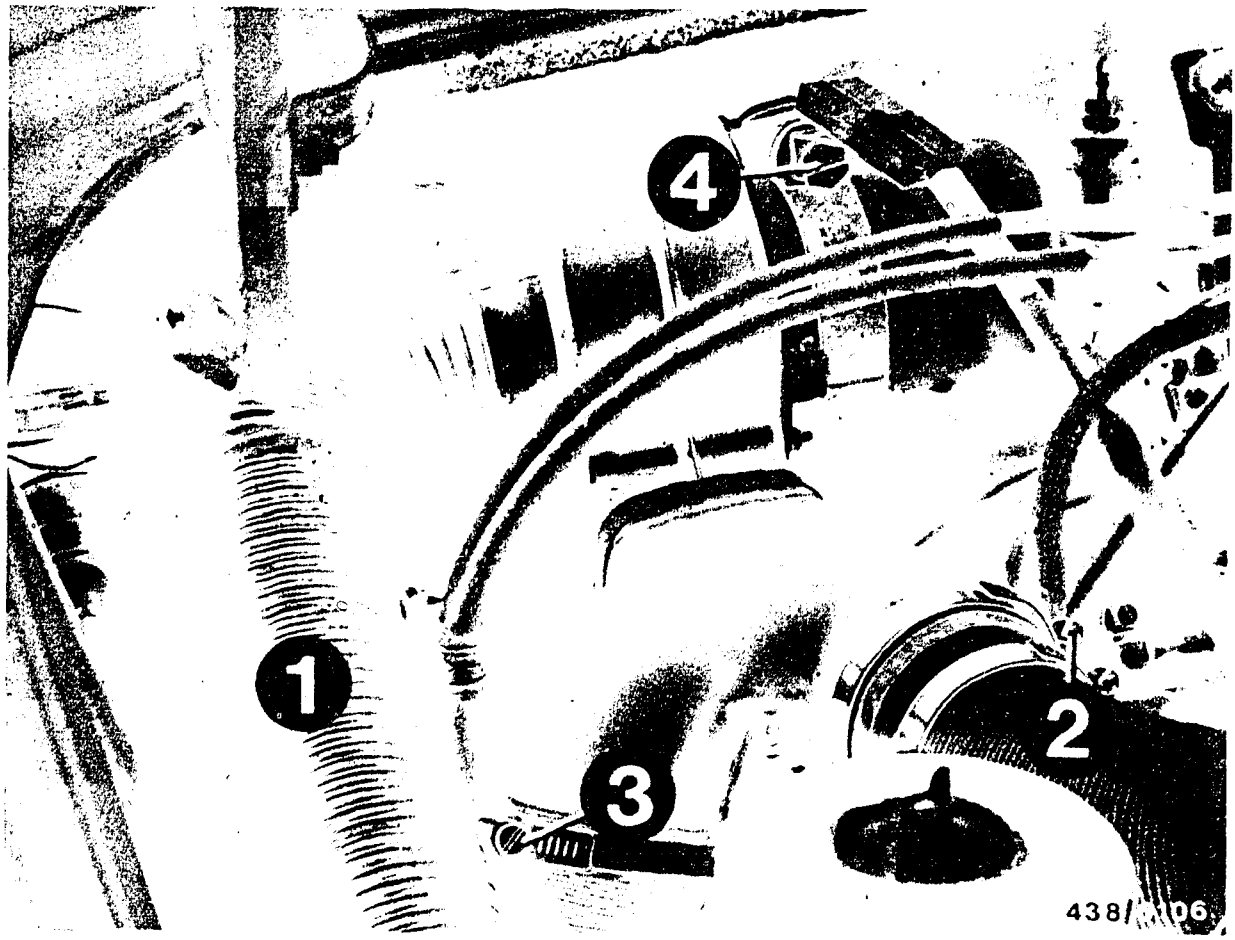
- Fuel return from warm-up regulator blocked or constricted (if control pressure too high).

- Warm-up regulator defective. Replace warm-up regulator.

If the warm-up regulator has failed due to fouling, the new warm-up regulator must be proveddd with tube fitting 1 433 356 802. Tightening torque 20...22 N m (2.0...2.2 kgfm).

When the warm-up regulator has been replaced or a fault remedied, carry out the idle adjustment with the engine at normal operating temperature.

Idle adjustment is described on Coordinates F 16.



Removing and installing the warm-up regulator:

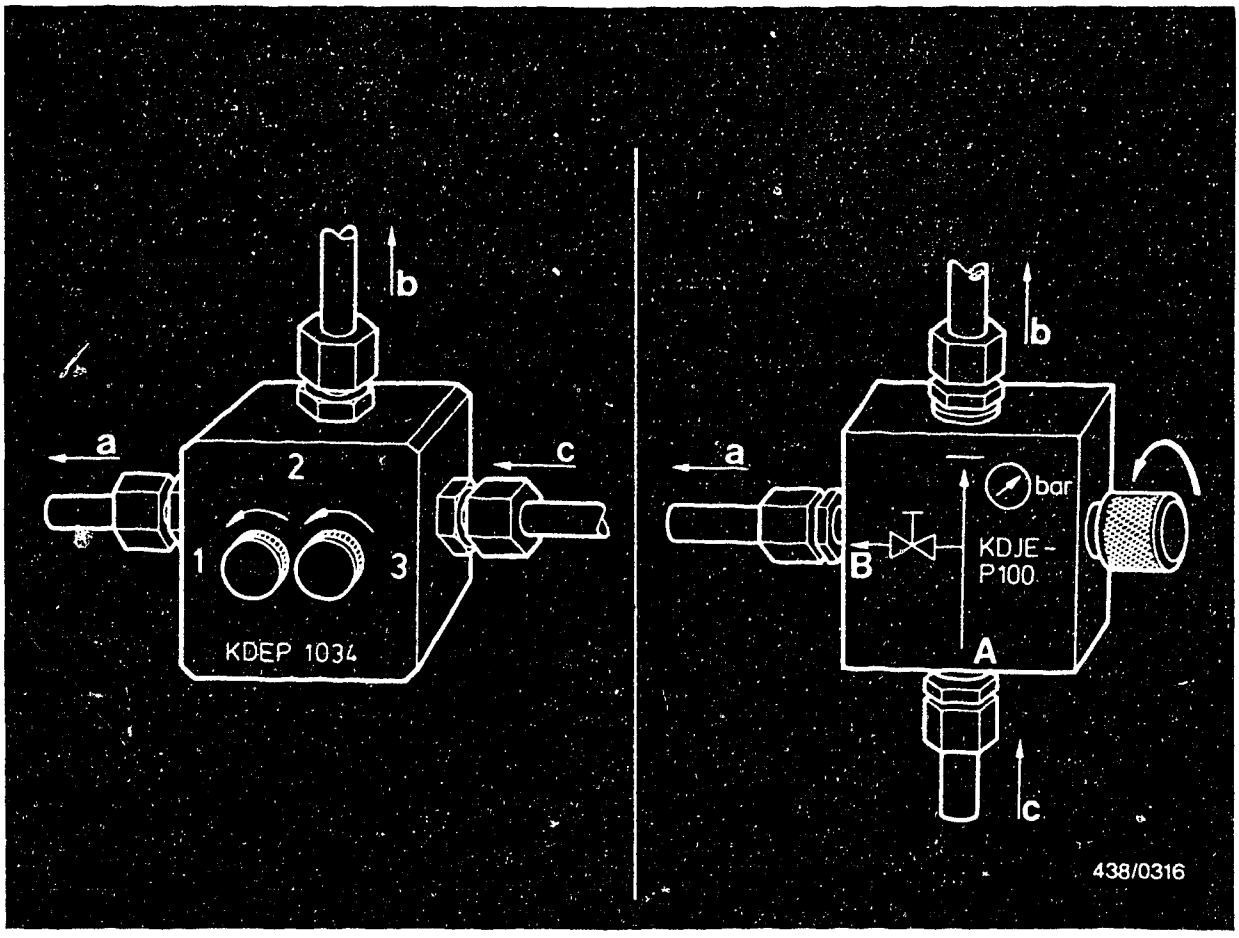
Before removing, dismantle the auxiliary-blower system as follows.

Remove intake hose 1 of the auxiliary blower.

Loosen the two hose clips 2 and 3 and remove the air hoses from the air distributor of the auxiliary blower.

Loosen clamping screw 4 of the blower motor and turn the motor with the air distributor upwards.

Replace the warm-up regulator and re-install the auxiliary-blower system in the reverse order.



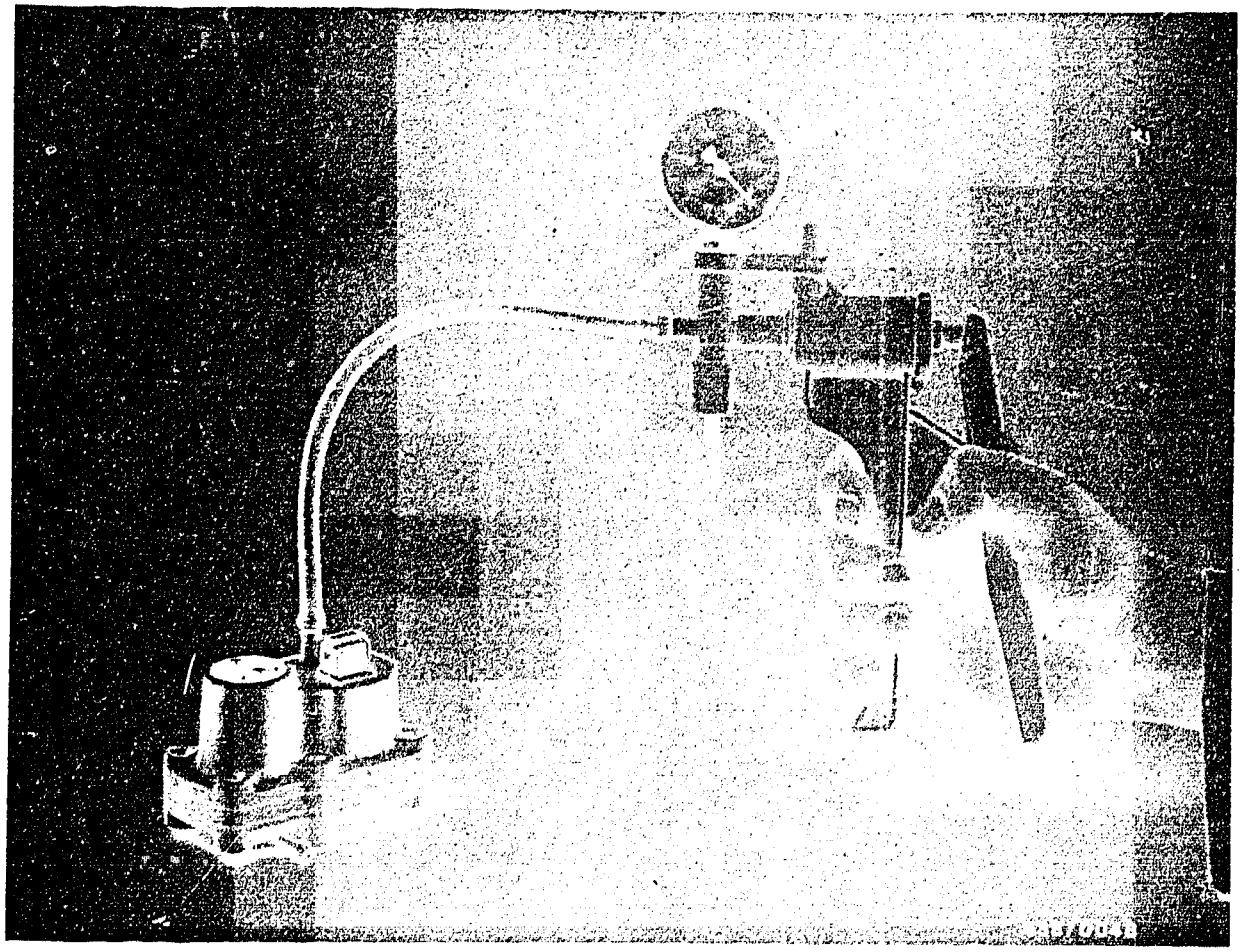
a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

Checking the "warm" control pressure

Warm-up regulator Part No.: 0 438 140 017
0 438 140 033

The test is performed with the engine switched off, once without intake-manifold pressure being applied, once with simulated intake-manifold pressure (vacuum) applied.

Open the valve screw of the directionalcontrol valve (or both valves in the case of KDEP 1034).



- Warm-up regulator Part No. 0 438 140 017
  0 438 140 033

For testing with simulated intake-manifold pressure, connect the vacuum pump to the intake-manifold-pressure connection port of the warm-up regulator (on top of the housing, next to the plug housing).

The picture shows the recommended Mityvac hand pump.

Setting value for the test: 520...546 mbar
(390...410 mmHg)

Test procedure:

The temperature of the engine is not important.
Open the valve screw of the directional-control valve (both in the case of KDEP 1034).
Switch on the electric fuel pump by bridging the electrical safety circuit.

Plug the plug onto the warm-up regulator.
The control pressure increases (warm-up regulator in the process of shutting off) until the "warm" control pressure is reached.

Test first of all without the application of intake-manifold pressure, then test with simulated intake-manifold pressure (vacuum) in accordance with the values given below:

Test step	Test specifications*
"Warm" control pressure Part No. of warm-up regulator: 0 438 140 005	
• Test with atmospheric pressure (without vacuum)	2.7...3.1 bar (2.8...3.2 kgf/cm²)
• For testing, connect vacuum pump to intake-manifold-pressure connection of warm-up regulator.	
Setting value: 520...546 mbar (390...410 mmHg)	3.4...3.8 bar (3.5...3.9 kgf/cm²)

*Pressures in the test-specification table are given in bar (gauge pressure) and/or in kgf/cm² (gauge pressure).

If the measured "warm" control pressure differs from the test specification, this may be due to one of the following faults:

If control pressure too high:

- Fuel delivery for the control-pressure circuit too high.
  Test fuel delivery.
  Test specification: 160...240 cm^3/min.

- Fuel return from the warm-up regulator blocked or constricted. Eliminate constriction.

- Warm-up regulator has hydraulic defect.
  Replace warm-up regulator.

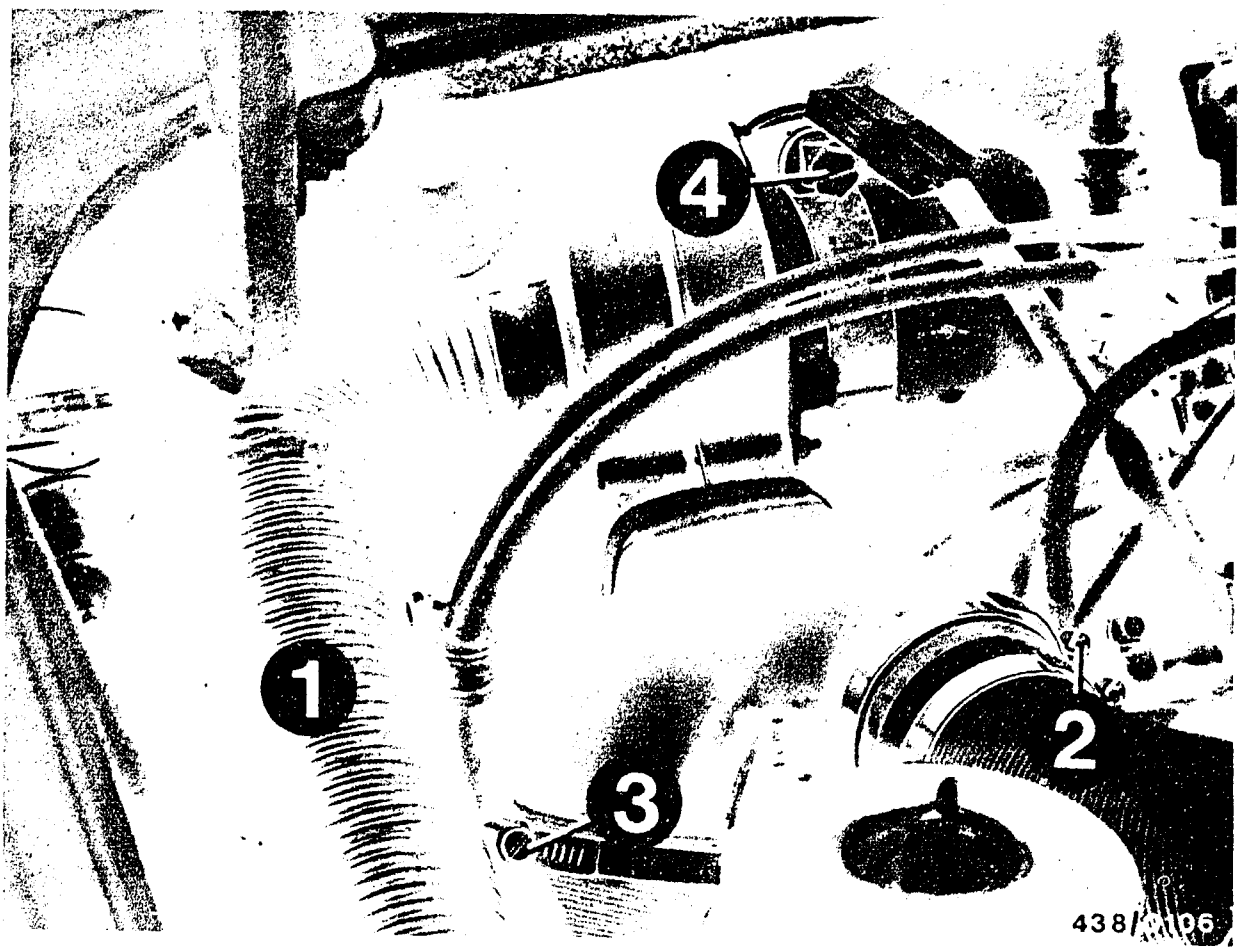
If control pressure too low:

- Power supply open-circuit.
  Eliminate open circuit. Ensure that the plug is contacting properly.

- Battery voltage too low, voltage drop.
  Eliminate voltage drop. Minimum voltage at connector: 11.5 V.
  If necessary, repeat test with engine running in order to obtain the normal generator voltage of approx. 14 V when the vehicle is in operation.

- Fuel delivery for the control-pressure circuit too low.
  Test fuel delivery.
  Test specification: 160...240 cm^3/min.

- Warm-up regulator defective. Heating coil open-circuit. Hydraulic defect. Replace warm-up regulator.



Removing and installing the warm-up regulator:

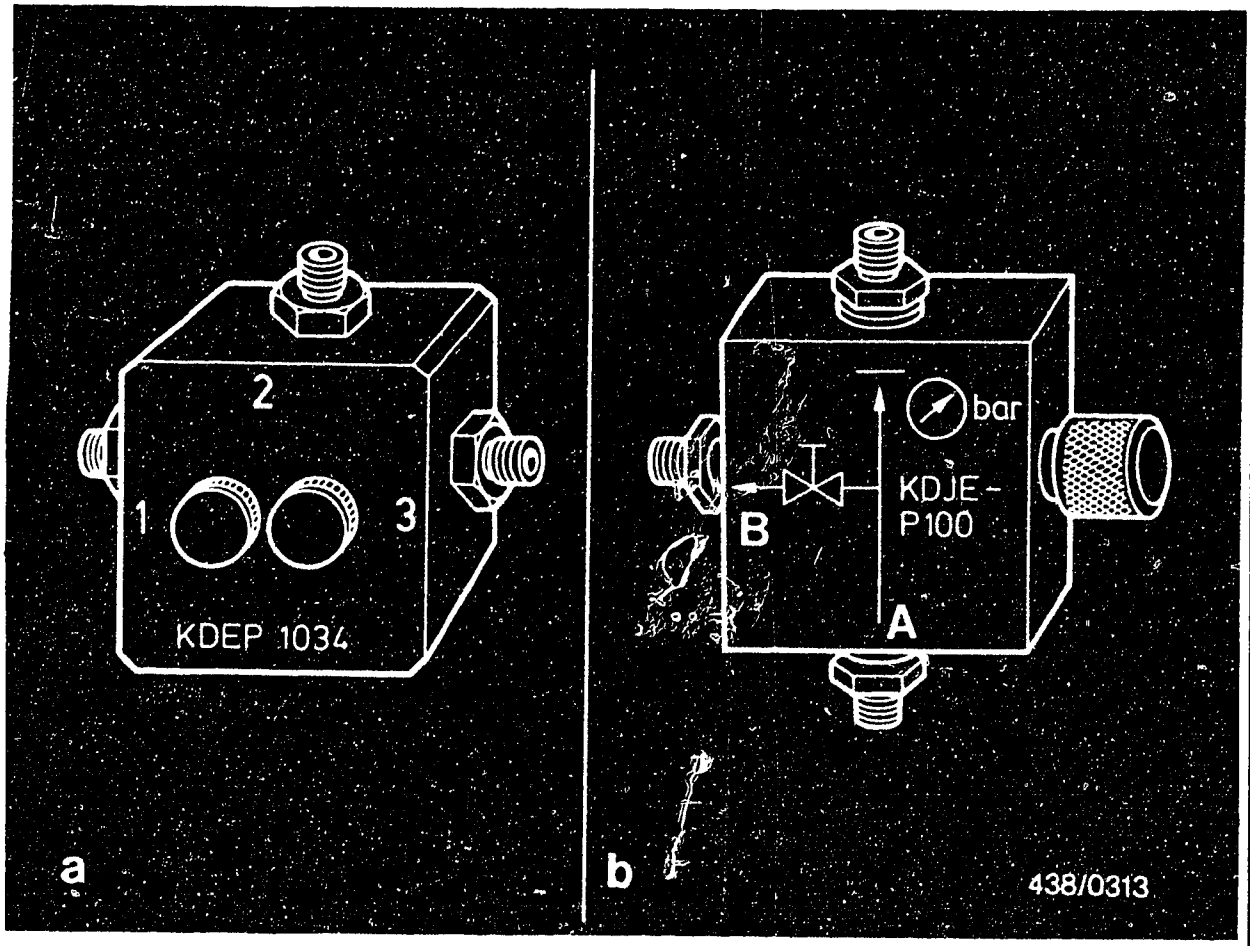
Before removing, dismantle the auxiliary-blower system as follows.

Remove intake hose 1 of the auxiliary blower.

Loosen the two hose clips 2 and 3 and remove the air hoses from the air distributor of the auxiliary blower.

Loosen clamping screw 4 of the blower motor and turn the motor with the air distributor upwards.

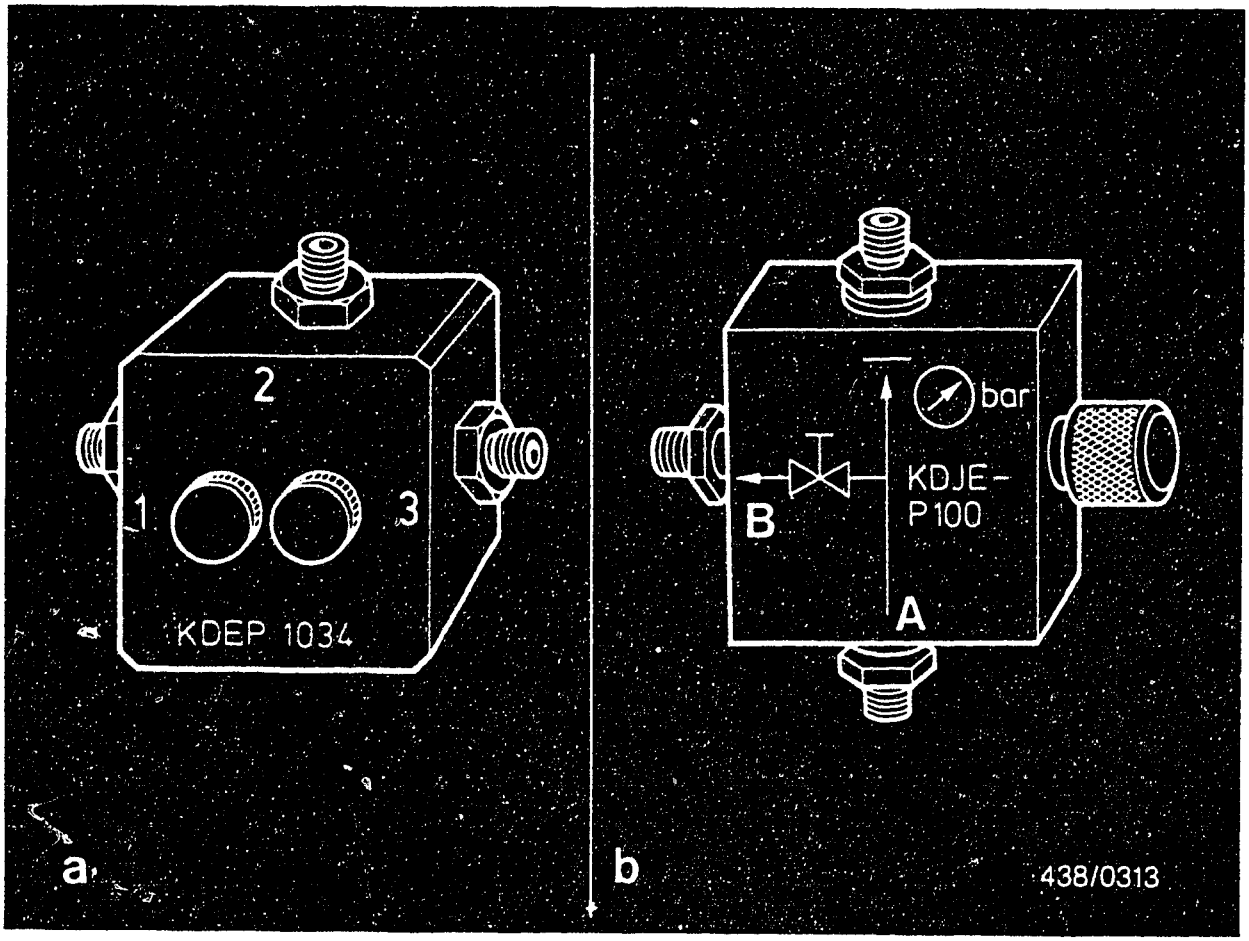
Replace the warm-up regulator and re-install the auxiliary-blower system in the reverse order.



15. Testing and adjusting the primary (system) pressure:

15.1 Mounting the pressure tester KDJE-P 100 (formerly KDEP 1034):

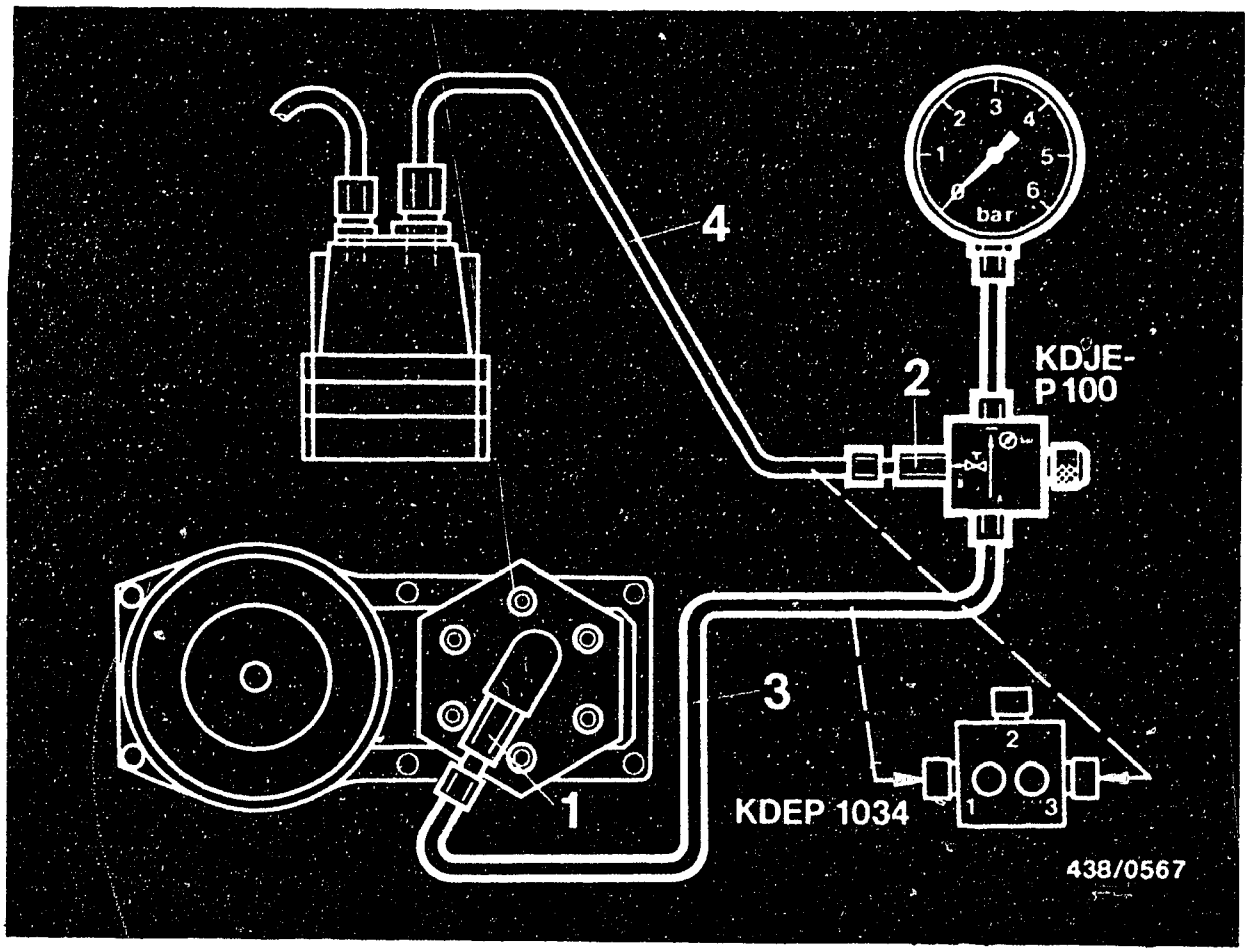
The pressure tester KDEP 1034 is equipped with a three-way valve with 2 separate valve screws. The connections of the directional-control valve are numbered (Fig. a).



Since the end of 1979 the pressure tester KDJE-P 100 has been supplied. Its directional-control valve has only one valve screw (Fig. b). The connections of this directional-control valve are identified by symbols:

A = Inlet (from the fuel distributor)
B = Outlet (to the warm-up regulator)

Caution:
When the directional-control valve is not in use, always keep the valve screw(s) open in order to relieve the pressure on the seal rings.



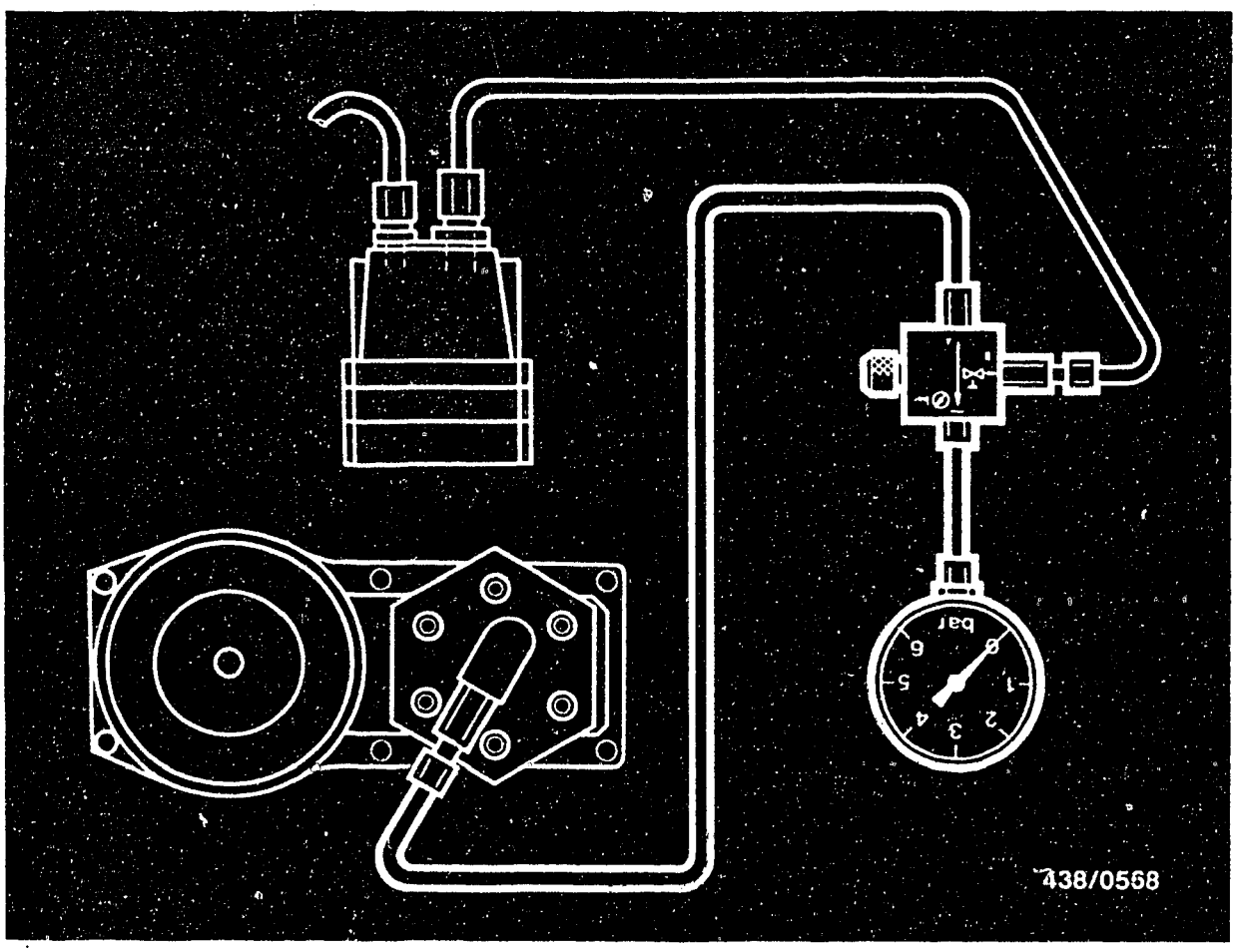
The directional-control valve of the pressure tester is connected into the control-pressure line from the fuel distributor to the warm-up regulator.

The connecting-parts set KDJE-P 100/10 is additionally required.

Screw the adapter of the connecting-parts set with seal ring to connection port B or 3 of the directional-control valve (2).

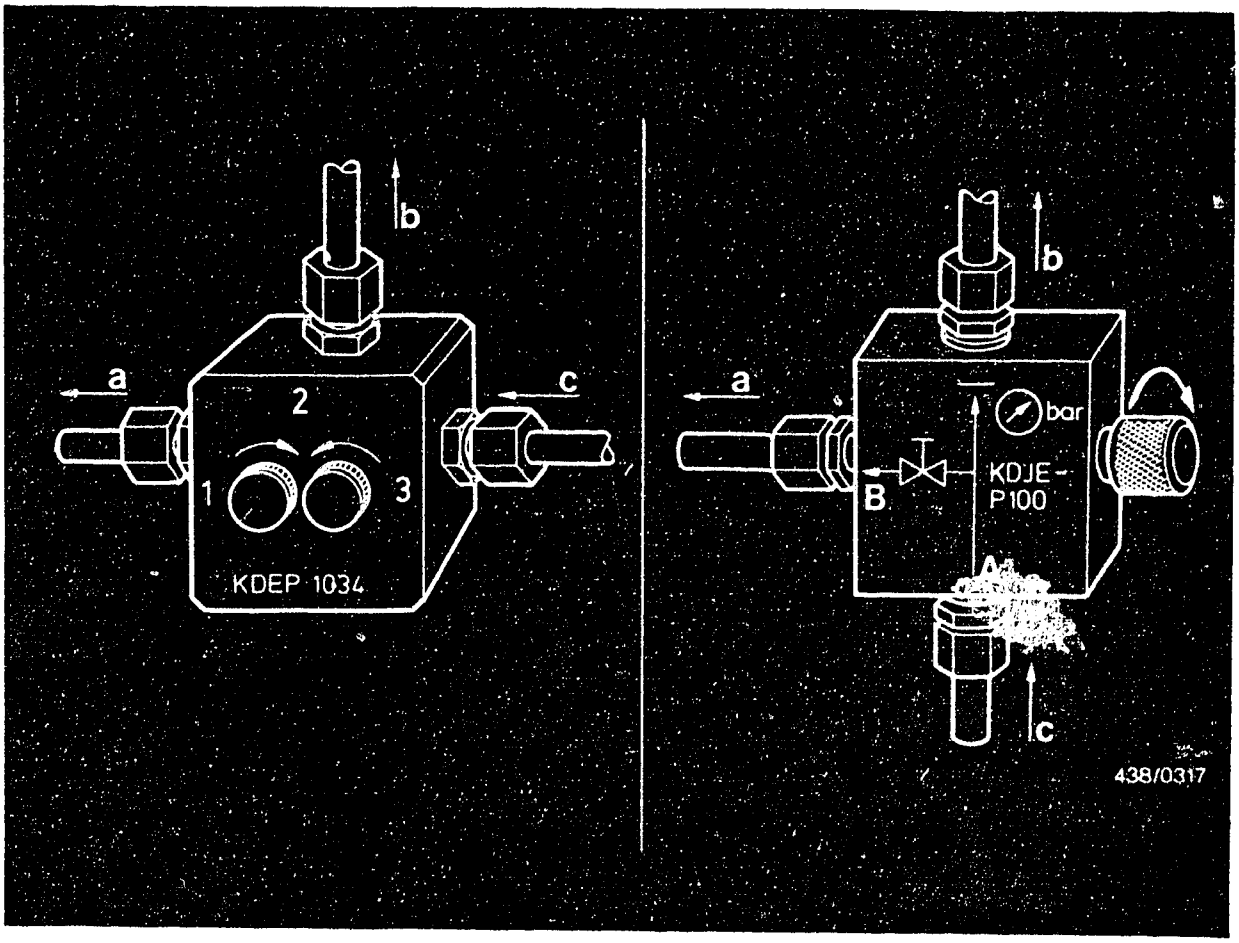
Unscrew the control-pressure line (to warm-up regulator) from the fuel distributor and connect to the adapter (4).

Screw connecting-piece of the connecting-parts set onto control-pressure connection port of the fuel distributor (1) and connect with connection port A or 1 of the directional-control valve via connecting hose (3).



15.2 Bleeding the pressure tester:

Disconnect the electric plug from the warm-up regulator and the auxiliary-air device.
Let the pressure gauge hang down (hose fully extended).
Switch on the electrical fuel pump by bridging the electrical safety circuit.
Open and close the valve screw of the directional-control valve (valve screw 3 in the case of KDEP 1034) in a 10-second rhythm about 5 times.
Then hang the pressure gauge from a suitable support (e.g. from one of the struts under the engine hood).
Open valve screw of directional-control valve (both screws in the case of KDEP 1034) (turning to the left).



a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

15.3 Testing the primary pressure:

The test is performed with the engine switched off. The temperature of the engine is not important.

Close the valve screw of directional-control valve KDJE-P 100. In the case of KDEP 1034, close valve screw 1, open valve screw 3.

Primary-pressure test specification:

4.5...5.2 bar (4.6...5.3 kgf/cm²) gauge pressure

Possible causes for too low a primary pressure:

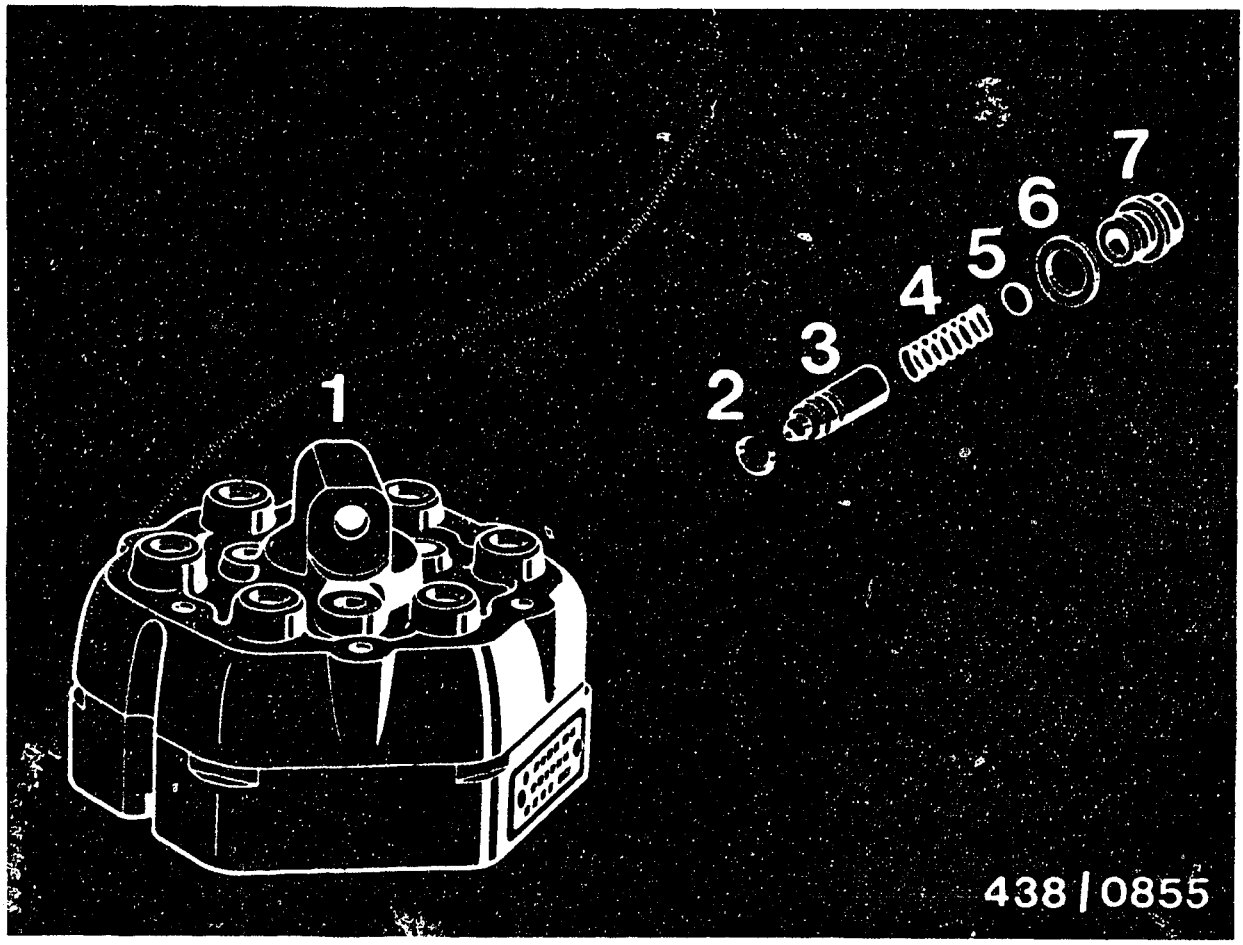
- Fuel supply faulty.
  (Delivery of electric fuel pump too low).

- Primary pressure set incorrectly.
  A precondition for readjustment of the primary pressure is always that the fuel supply is in order.
  Measure the fuel delivery
  Nominal value for fuel delivery = min. 1000 cm³/30 s

Possible causes for too high a primary pressure:

- A restriction in the return line leading to the fuel tank.

- Primary-pressure regulator set incorrectly.
  For this reason, before readjusting to high a primary pressure, always first check the condition of the return line leading to the fuel tank.



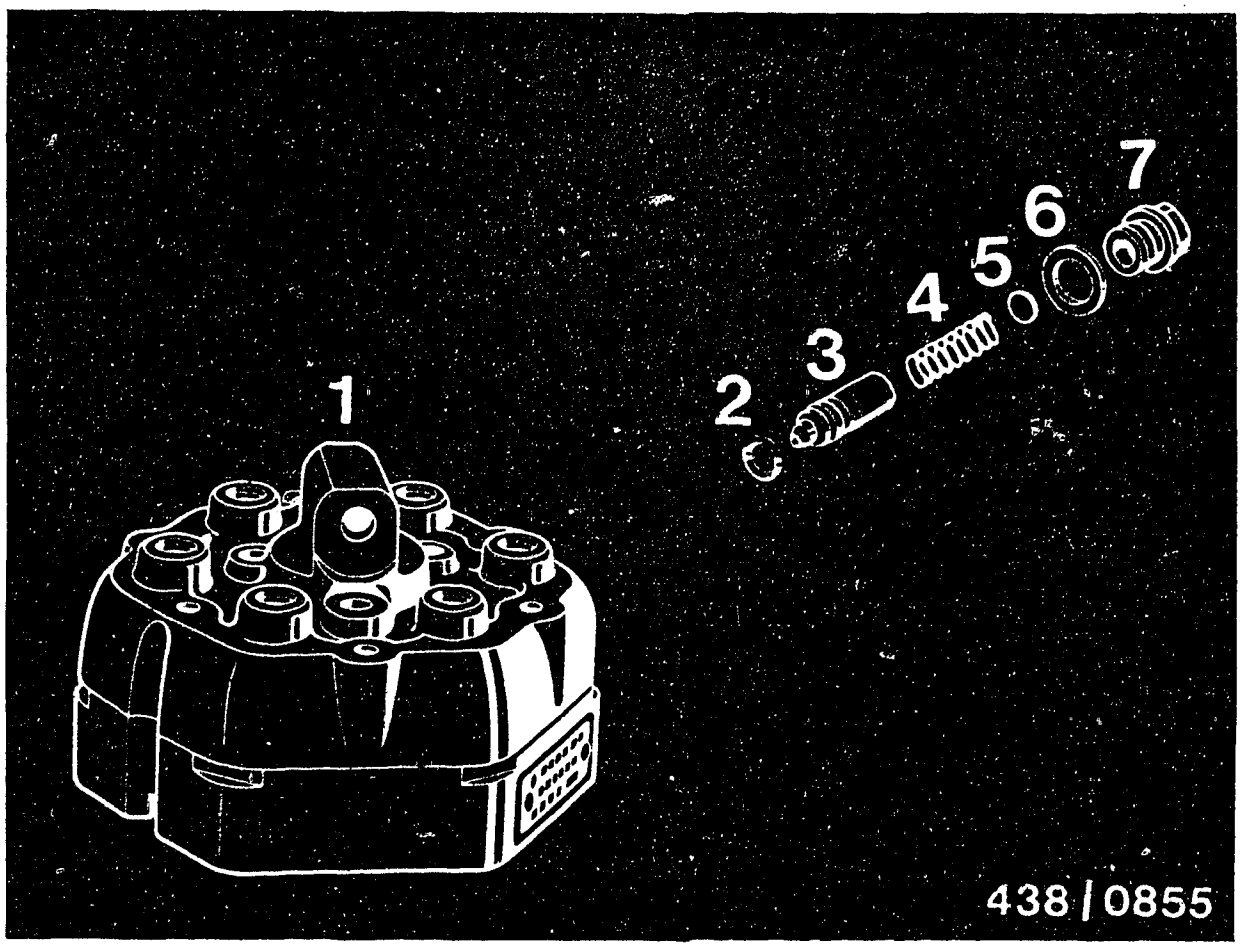
1 = Fuel distributor
2 = O-ring
3 = Control piston
4 = Control spring
5 = Shim(s)
6 = Flat seal ring
7 = Screw plug

15.4 Adjusting the primary pressure:
Primary pressure setting value:
4.9...5.1 bar (5.0...5.2 kgf/cm²) gauge pressure

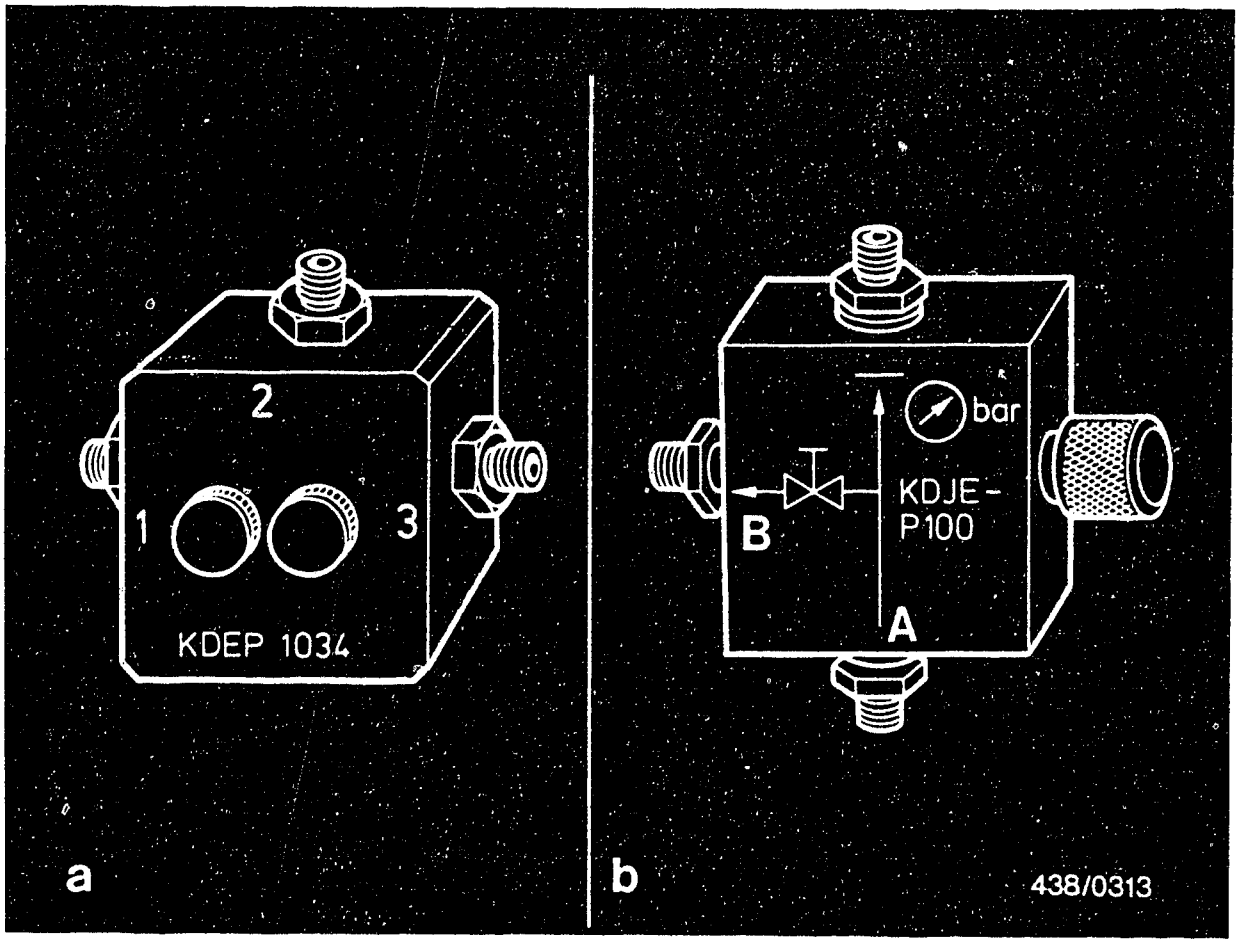
Re-adjust the primary pressure by changing the shims Item 5.

Note: 0.1 mm increased shim thickness means approx. 0.15 bar pressure rise and vice versa.

When installing the screw plug, always use a new seal ring (Item 6).



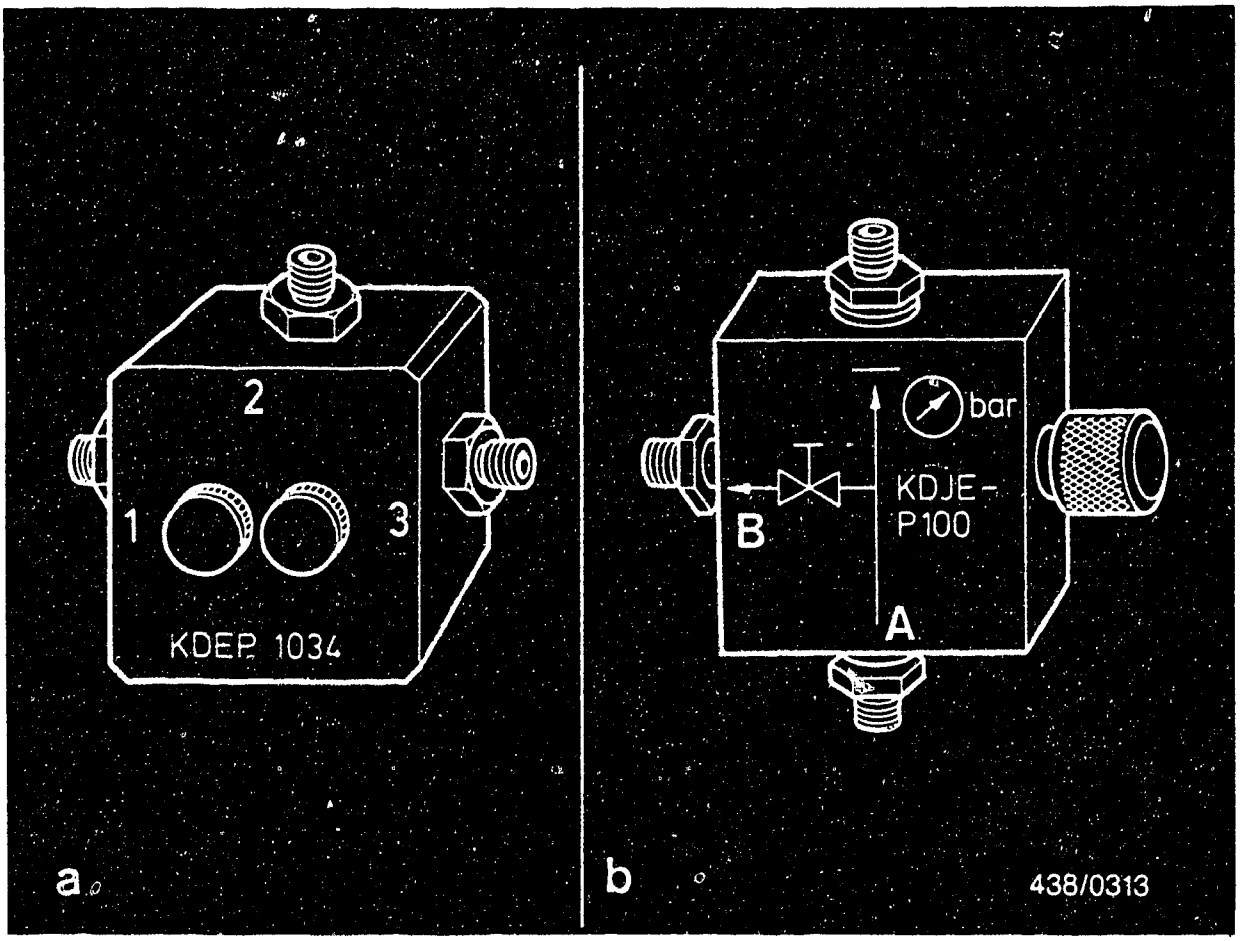
The control piston (3) of the primary-pressure regulator must not be lost. It was matched at the factory to the fuel distributor housing and is therefore the only individual part on the primary-pressure regulator which may not be replaced.



16. Testing the entire fuel system for leaks.

16.1 Mounting the pressure tester KDJE-P 100 (formerly KDEP 1034):

The pressure tester KDEP 1034 is equipped with a three-way valve with 2 separate valve screws. The connections of the directional-control valve are numbered (Fig. a).

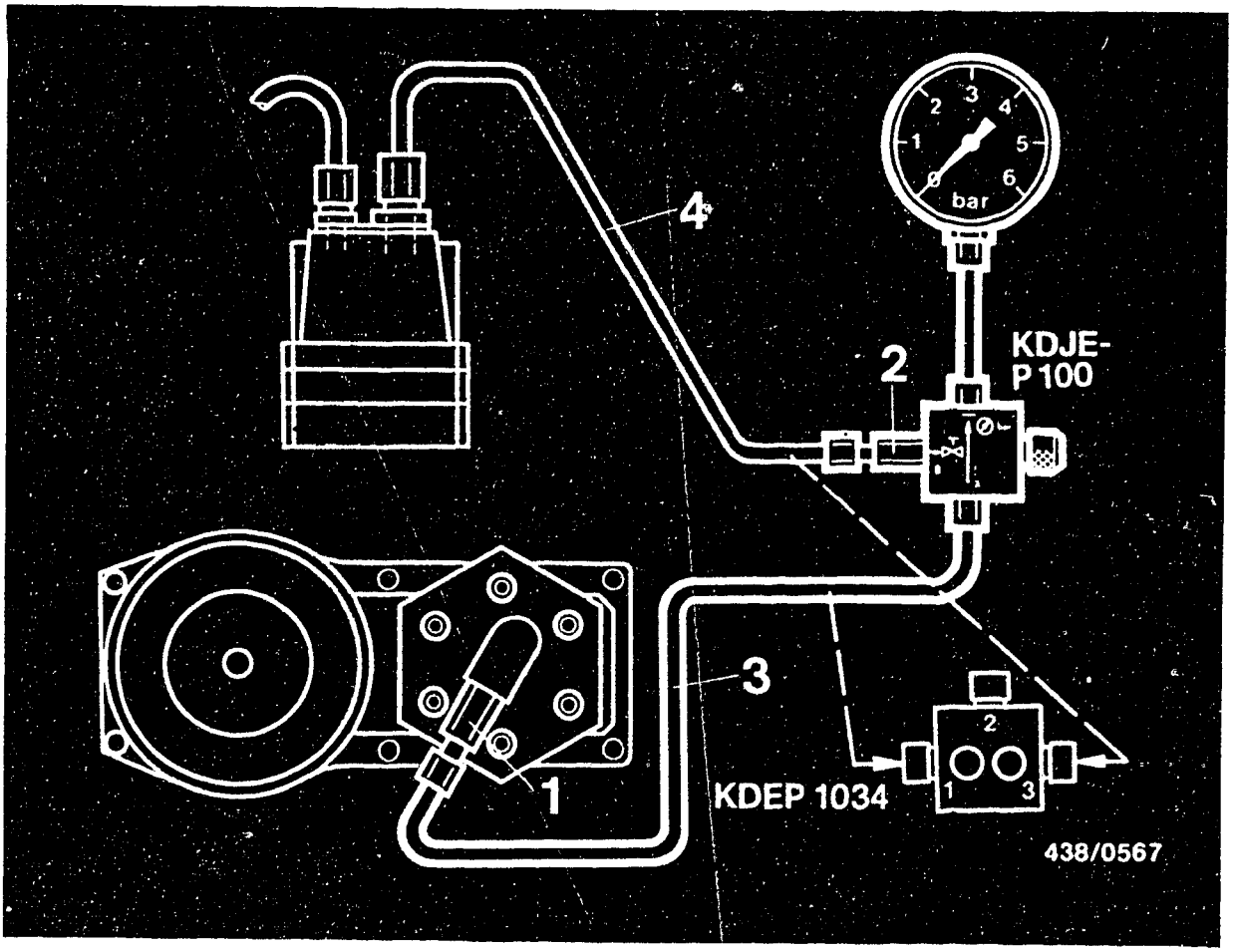


Since the end of 1979 the pressure tester KDJE-P 100 has been supplied. Its directional-control valve has only one valve screw (Fig. b). The connections of this directional-control valve are identified by symbols:

A = Inlet (from the fuel distributor)
B = Outlet (to the warm-up regulator)

Caution:

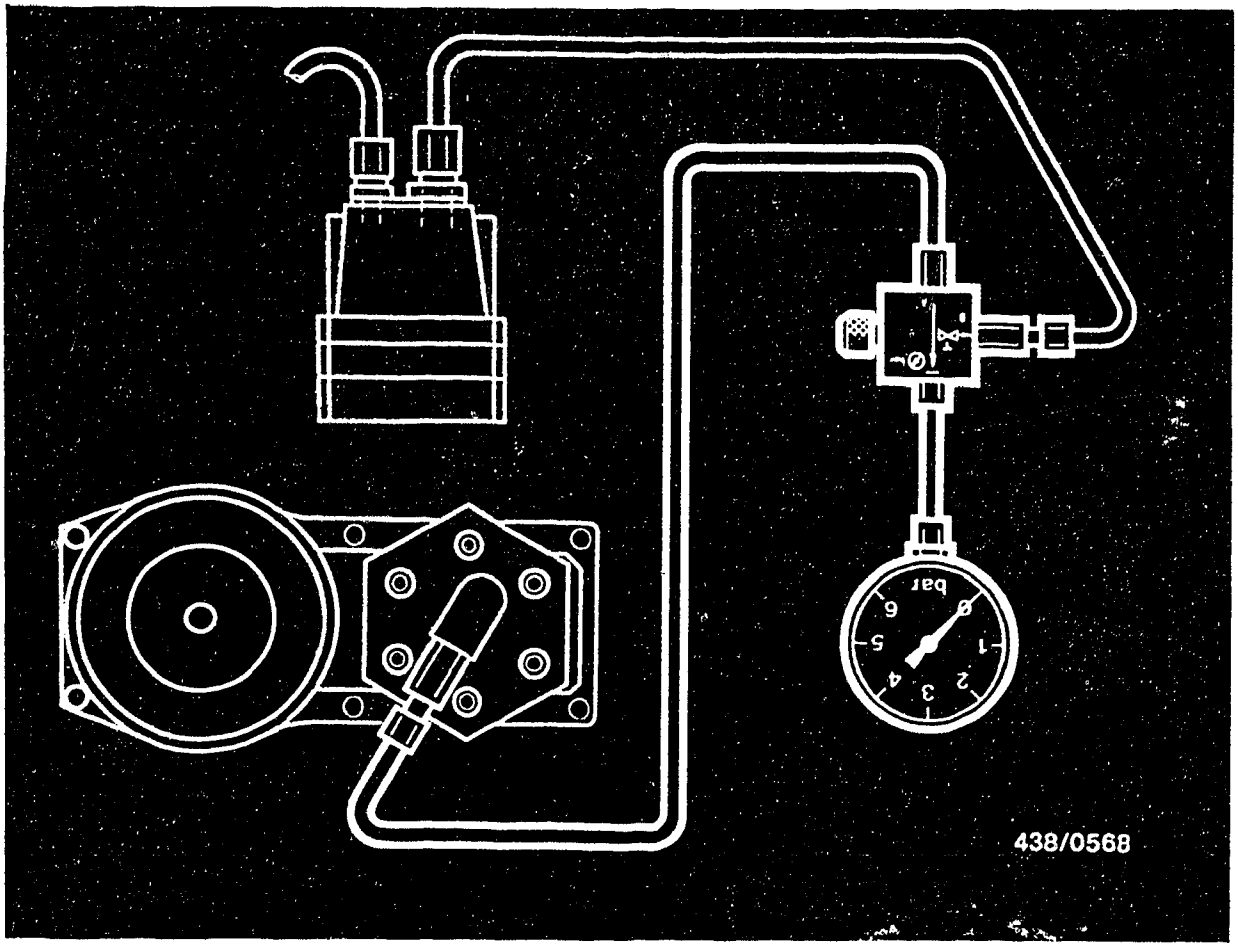
When the directional-control valve is not in use, always keep the valve screw(s) open in order to relieve the pressure on the seal rings.



Caution:
When the directional-control valve is not in use, always keep the valve screw(s) open in order to relieve the pressure on the seal rings.
The directional-control valve of the pressure tester is connected into the control-pressure line from the fuel distributor to the warm-up regulator.

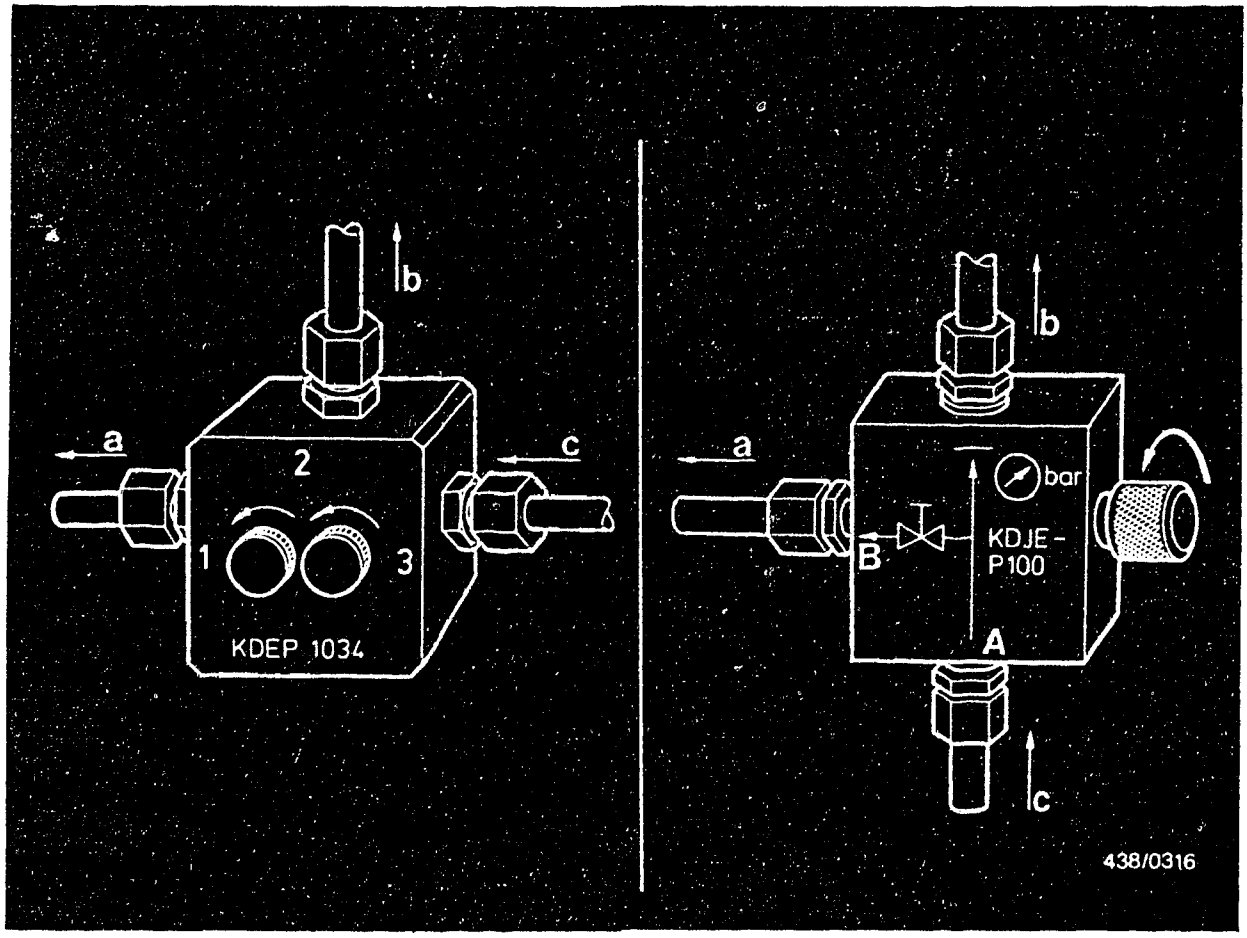
The connecting-parts set KDJE-P 100/10 is additionally required.
Screw the adapter of connecting-parts set with seal ring to connection port B/3 of directional-control valve (2). Unscrew the control-pressure line (to warm-up regulator) from the fuel distributor and connect to the adapter. (4).

Screw connecting piece of connecting-parts set to control-pressure connection port of the fuel distributor (3) and connect with connection port A/1 of the directional-control valve via connecting hose (3).



16.2 Bleeding the pressure tester:

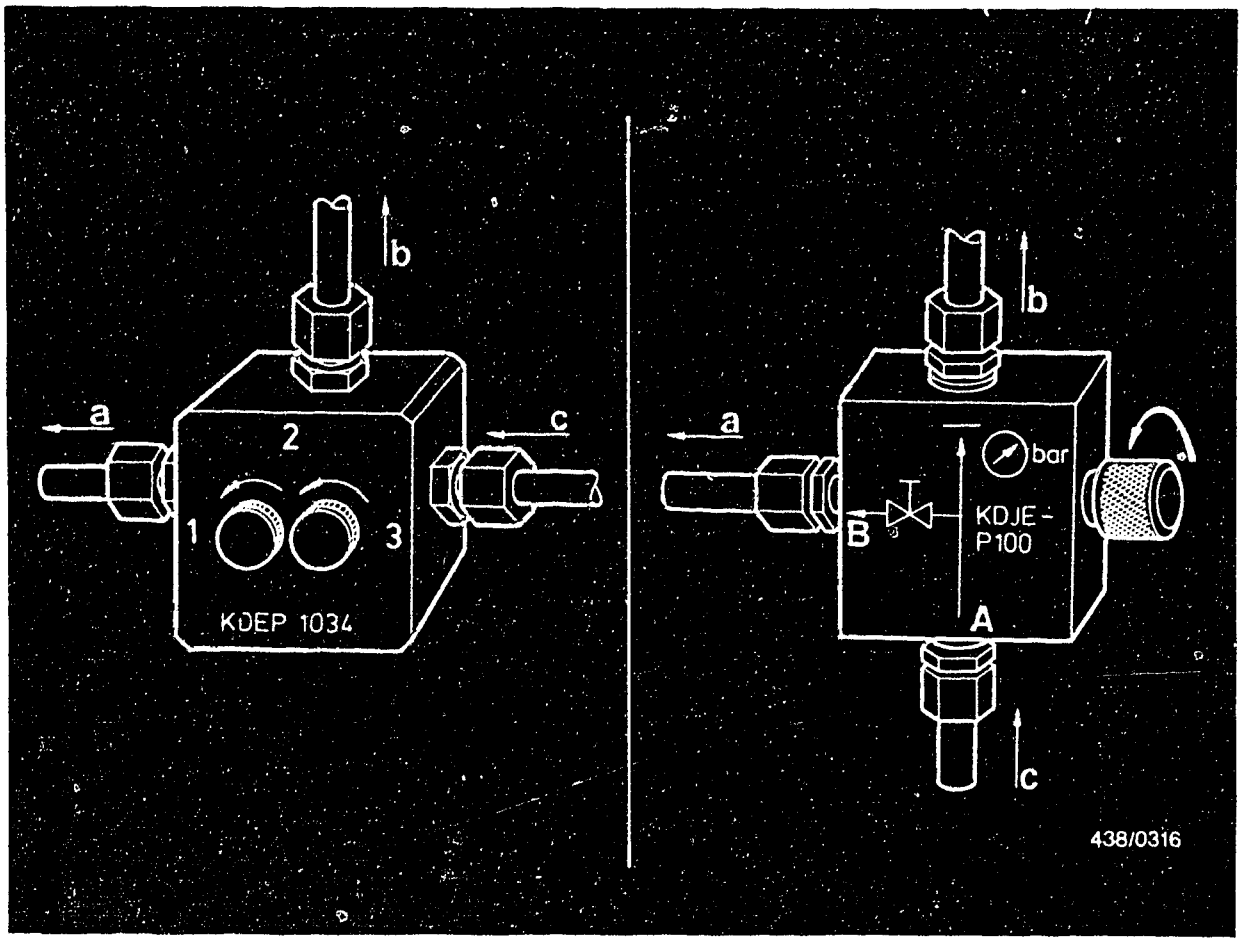
Disconnect the electric plug from the warm-up regulator and the auxiliary-air valve.
Let the pressure gauge hang down (hose fully extended).
Switch on the electric fuel pump by bridging the electrical safety circuit.
Open and close the valve screw of the directional-control valve (valve screw 3 in the case of KDEP 1034) in a 10-second rhythm about 5 times.
Then hang the pressure gauge from a suitable support (e.g. from one of the struts under the engine hood).
Open valve screw of directional-control valve (both screws in the case of KDEP 1034) (turning to the left).



a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

16.3 Leak test

The test is performed with the engine switched off. Make the test with a warm engine but not immediately after the engine has been operated at a high temperature.
Open the valve screw of the directional-control valve (both valves in the case of KDEP 1034).

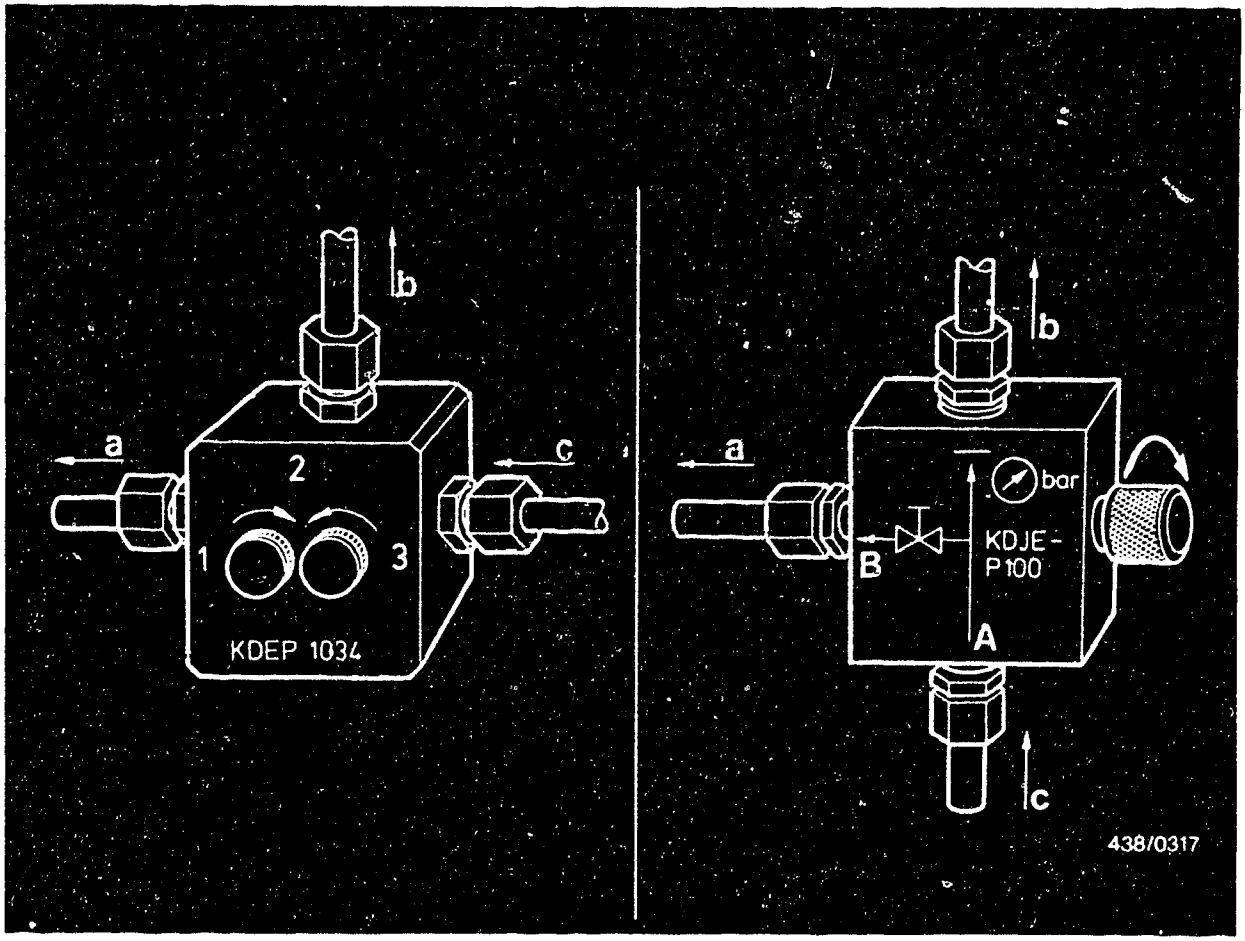


Switch on the electric fuel pump by bridging the electrical safety circuit until the warm-up regulator has ceased to operate ("warm" control pressure).

Switch the electric fuel pump off again and observe the drop in pressure on the pressure gauge.
Test specifications for leak test:

Minimum pressure after:

10 minutes: 1.9 bar (2.0 kgf/cm^2) gauge pressure
20 minutes: 1.7 bar (1.8 kgf/cm^2) gauge pressure

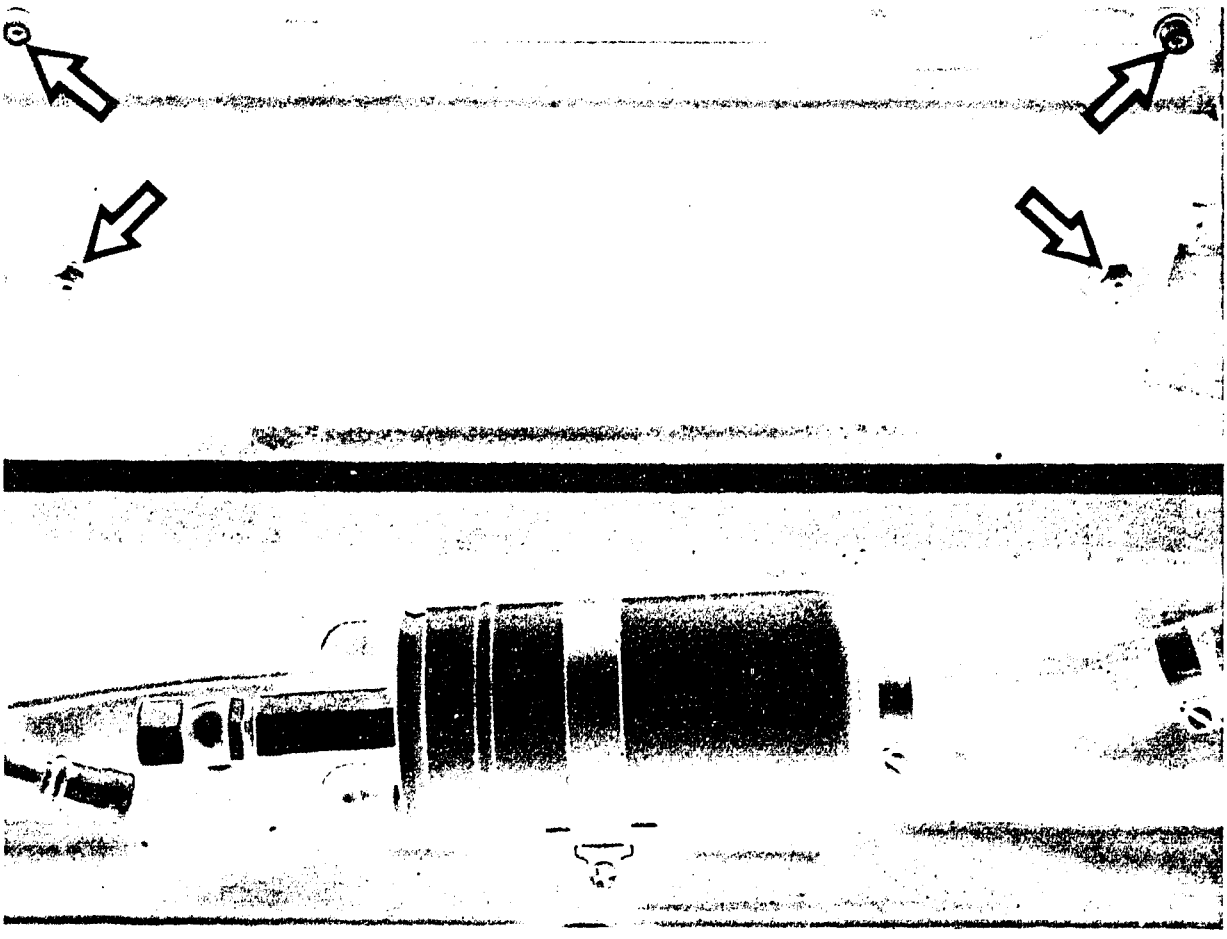


a = To warm-up regulator
b = To pressure gauge
c = From fuel distributor

If the pressure drops too quickly, repeat the test with the control-pressure circuit disconnected.

Position of the valve screws:
Close the valve screw of the directional-control valve KDJE-P 100.
In the case of KDEP 1034, close valve screw 1, open valve screw 2.

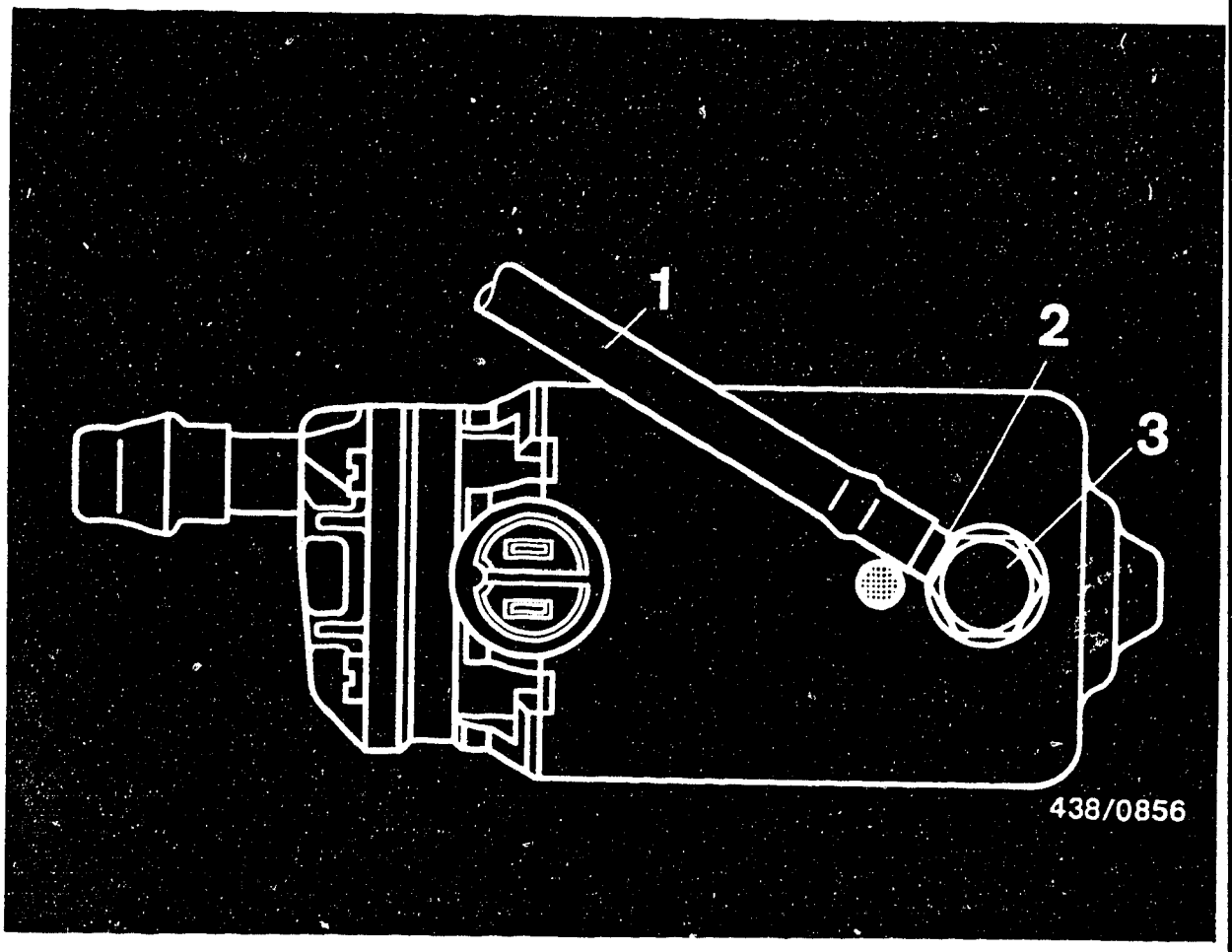
If the same result is found, the leak is in the primary-pressure circuit.
If the test results are correct during the second test, the leak is in the control-pressure circuit.



16.4 Possible causes of trouble in the primary-pressure circuit:

- Non-return valve of electric fuel pump leaking.

  The electric fuel pump is installed at the front in front of the front axle.
  The pump is made accessible by removing the dirt deflector plate (unscrew 2 hexagon-socket-head cap screws and 2 nuts).



1 = Delivery line (Tecalan line)
2 = Inlet union with non-return valve
3 = Inlet-union screw

Changing the non-return valve on the 1976 model:
Electric fuel pump 0 580 254 985, Type EKP I.

The non-return valve is integrated in the inlet union of the delivery line. Remove the complete delivery line (polyamide line) from the electric fuel pump to the fuel accumulator.

Part number of inlet union with non-return valve
1 583 385 006.
Matching seal rings: 1 580 203 002.

Clamp defective inlet union with line into vise. Cut open the line at the fishbone section by melting with a hot soldering iron and pull off.

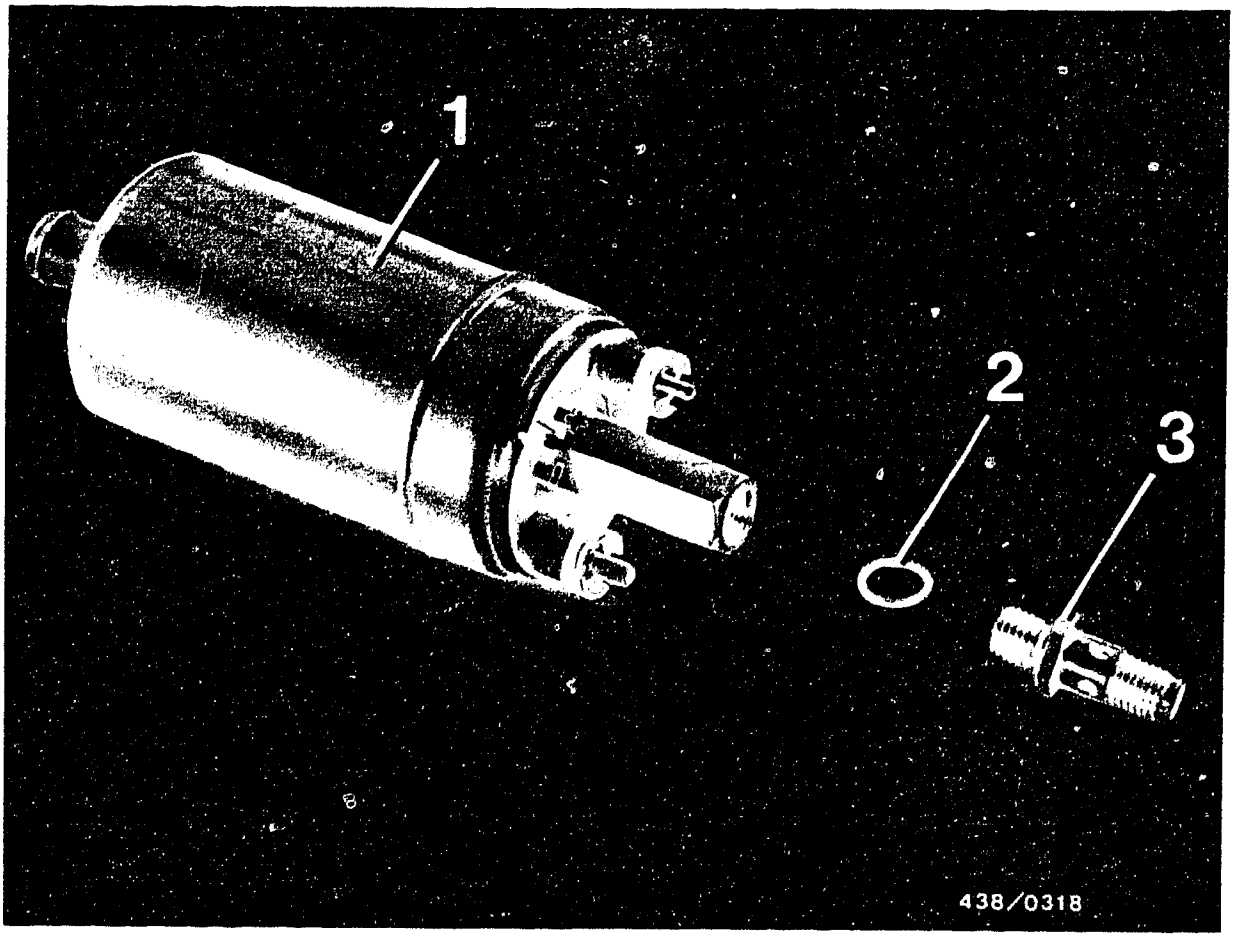
Caution:
Never heat the line with a naked flame!
Danger of fire due to fuel remains!

Cut off as short as possible that part of the line which has been cut open with the soldering iron.

Clamp new inlet union in vise with protective jaws (sealing faces must not be damaged) and push the line cold as far as it will go onto the fishbone section with the aid of the assembly tool KDEP 1039.

Note:
Do not heat the line for assembly since it expands but does not contract. A tight fit is therefore not guaranteed. Danger of leaks.

Re-install the complete line and connect the inlet union with new seal rings, part number 1 580 203 002 to the electric fuel pump.
Observe the tightening torque for the inlet-union screw: 1.6...2.3 Nm.

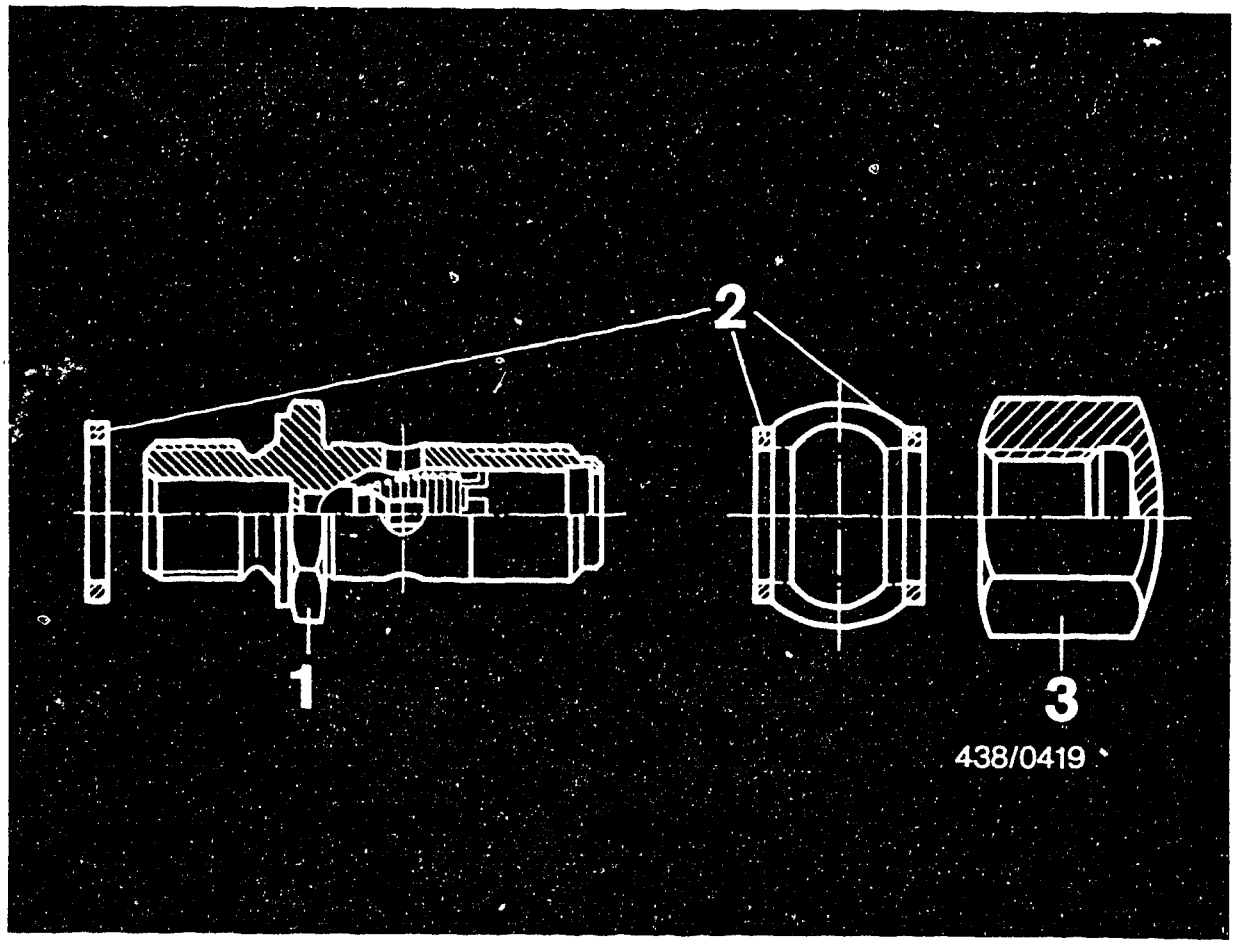


1 = Electric fuel pump
2 = Flat seal ring
3 = Tube fitting

Changing the non-return valve in the 1977 model

Part No. of electric fuel pump: 0 580 254 984
Type EKP IV

The non-return valve is built into the tube fitting and cannot be exchanged.
In order to avoit having to change the whole electric fuel pump in the case of a leaking non-return valve, a parts set has been produced with a separate non-return valve, which can be used on the above-mentioned electric fuel pump.
Part No. of the parts set: 1 587 010 003.



1 = Tube fitting with built-in non-return valve
2 = Flat seal rings
3 = Cap nut

Parts set: 1 587 010 003

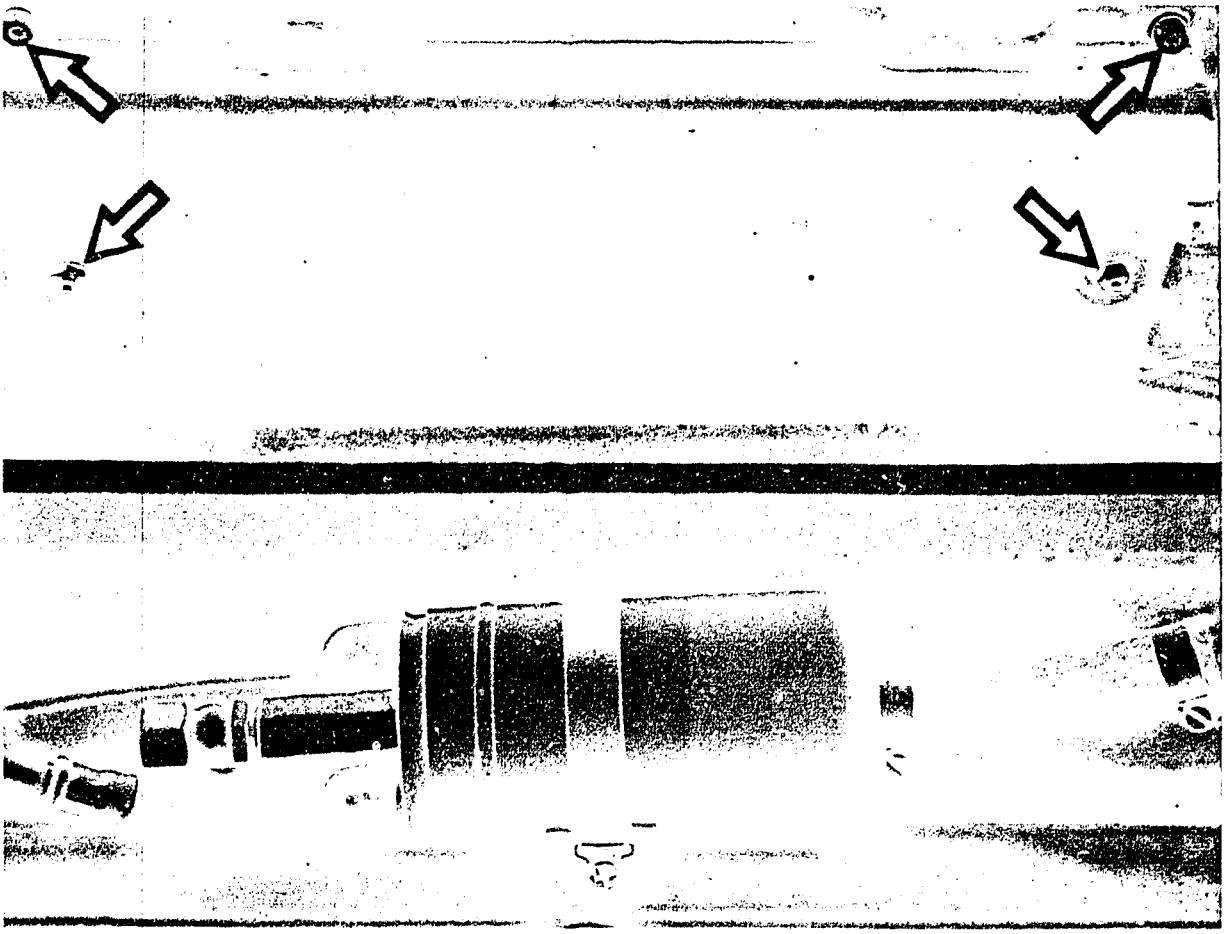
Installation:

Thoroughly clean the connection of the delivery line on the electric fuel pump.
Pinch off the intake hose (fuel tank - electric fuel pump) (e.g. using hose clamper W 157 from Matra Co.).
Screw off the delivery line, collecting any escaping fuel.

The defective original non-return valve remains in the electric fuel pump.

Screw a tube fitting of the parts set (short end) with thick flat seal ring into the pressure connection piece and tighten to a torque of 17...25 Nm.
At the same time apply a wrench to the hexagonal section of the pressure connection piece.
Fit a thin flat seal ring, fuel-line inlet union and another flat seal ring onto the long end of the tube fitting and tighten with the hexagon cap nut.
Remove hose clamper from intake hose.

Check connections for leaks with the electric fuel pump in operation.

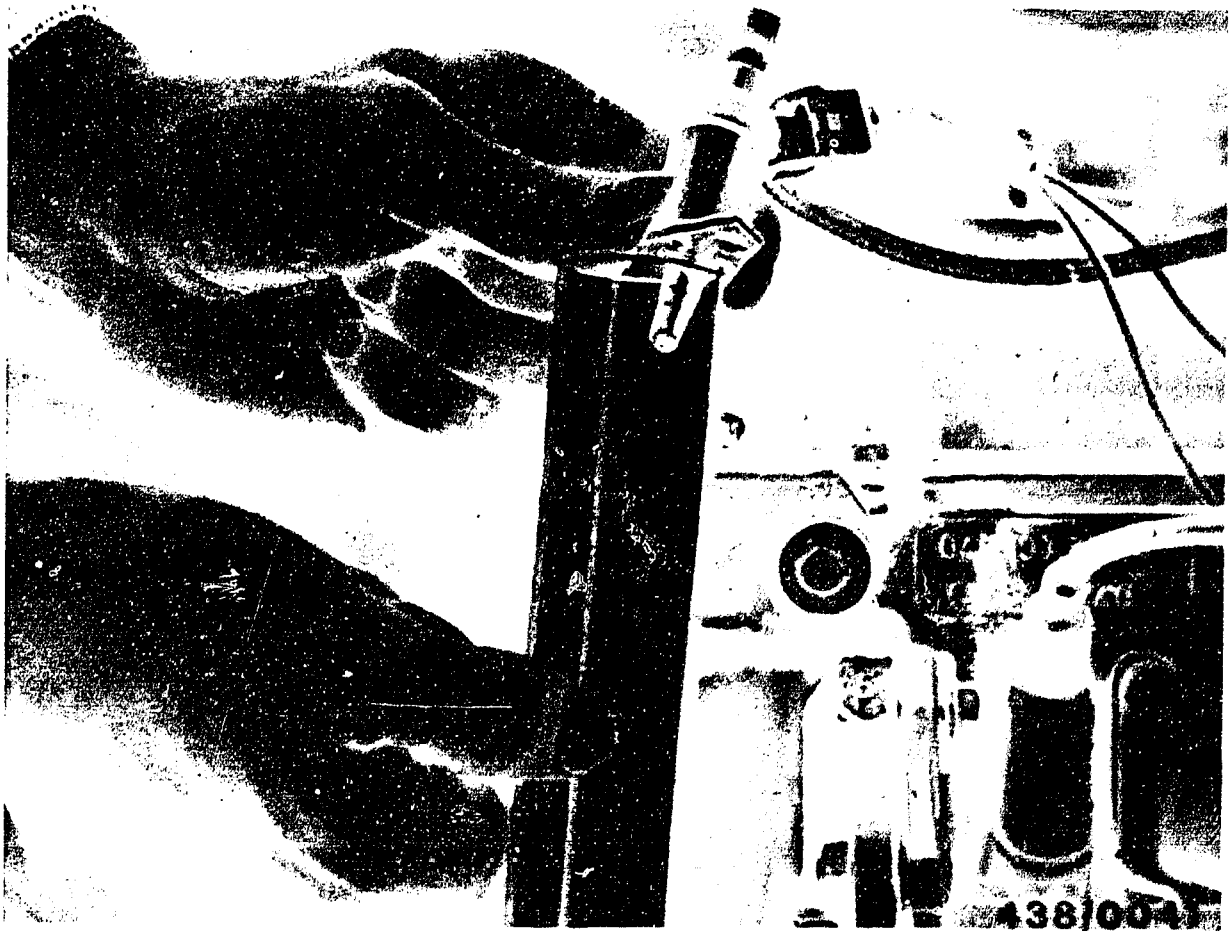


Fitting of the dirt-deflector plate:

Caution:

The fastening screws and nuts are at the same time fastening elements for the front-axle auxiliary support and the anti-roll bar.
Therefore, when fitting the dirt-deflector plate, be sure to observe the specified tightening torques for the screws and nuts.

Hexagon-socket-head cap screws = 47 Nm (4.7 kgfm)
Self-locking nuts = 28 Nm (2.8 kgfm)
After the nuts have been removed several times they will lose their self-locking characteristic (nuts can easily be turned).
Therefore, if necessary, use new self-locking nuts.



Further possible cause of leaks in the primary-pressure circuit:

- Start valve leaking.

  Remove the start valve for testing. It is installed on the rear side of the intake housing below the throttle-valve assembly. For removal and installation it is advisable to use a mirror so that the connections and fastening screws can be seen.
  Remove the plug from the valve. The fuel line remains connected.

  Hold the start valve in a container (e.g. graduate).

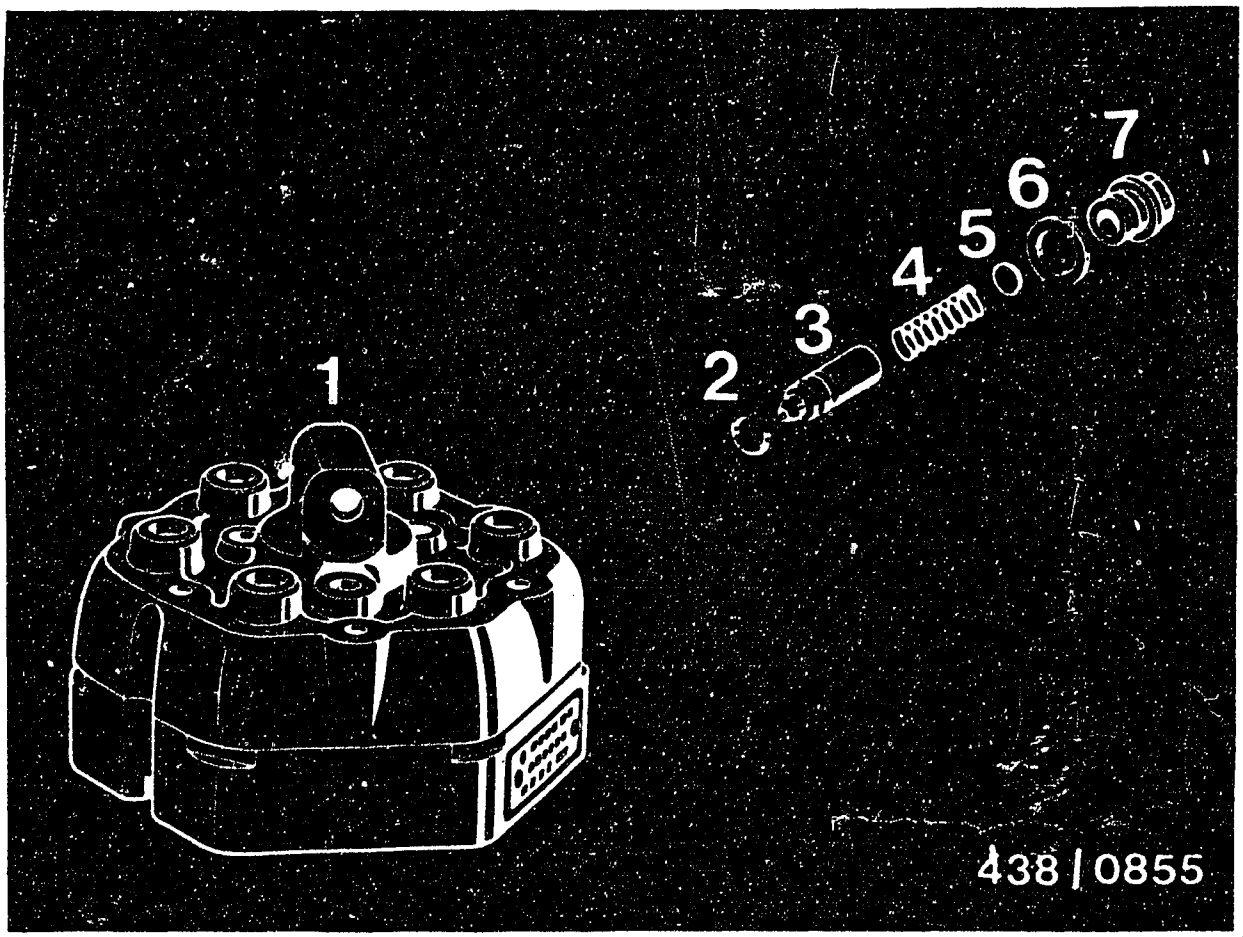
Switch on the electric fuel pump by bridging the electrical safety circuit so that primary pressure is applied to the start valve.

Dry off the nozzle of the cold-start valve.

No drops must fall from the nozzle of the start valve within the next minute. Even when shaken and knocked, the start valve must not leak.

Switch the electric fuel pump off again.

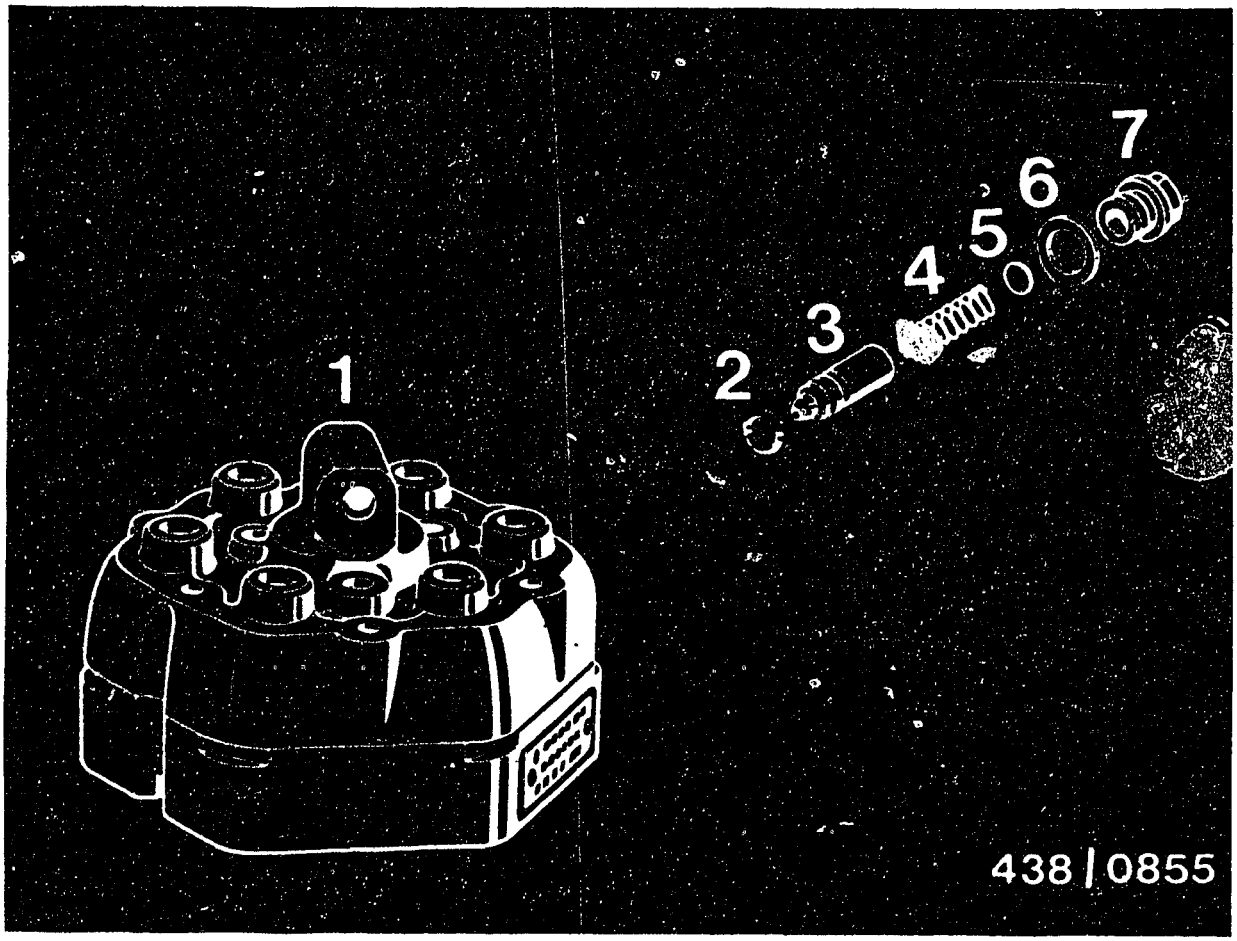
Replace the cold-start valve if leaky.
Finally, adjust idle speed with the engine at operating temperature.
Idle-speed adjustment is described on Coordinates F 16.



1 = Fuel distributor
2 = O-ring
3 = Control piston
4 = Control spring
5 = Shim(s)
6 = Flat seal ring
7 = Screw plug

Other possible causes of defect in the primary-pressure circuit:

- Seal ring (O-ring) (2) on control piston (3) has a leak.
  Replace seal ring:
  Clean fuel distributor in the region of the primary-pressure regulator. Screw out screw plug (7) (pay attention to shims), remove control spring (4) and control piston (3).
  Replace seal ring (O-ring) (2) on control piston, install control piston and spring.



1 = Fuel distributor
2 = O-ring
3 = Control piston
4 = Control spring
5 = Shim(s)
6 = Flat seal ring
7 = Screw plug

Screw in screw plug (7) with shims (5) as found when removing and new flat seal ring (6).

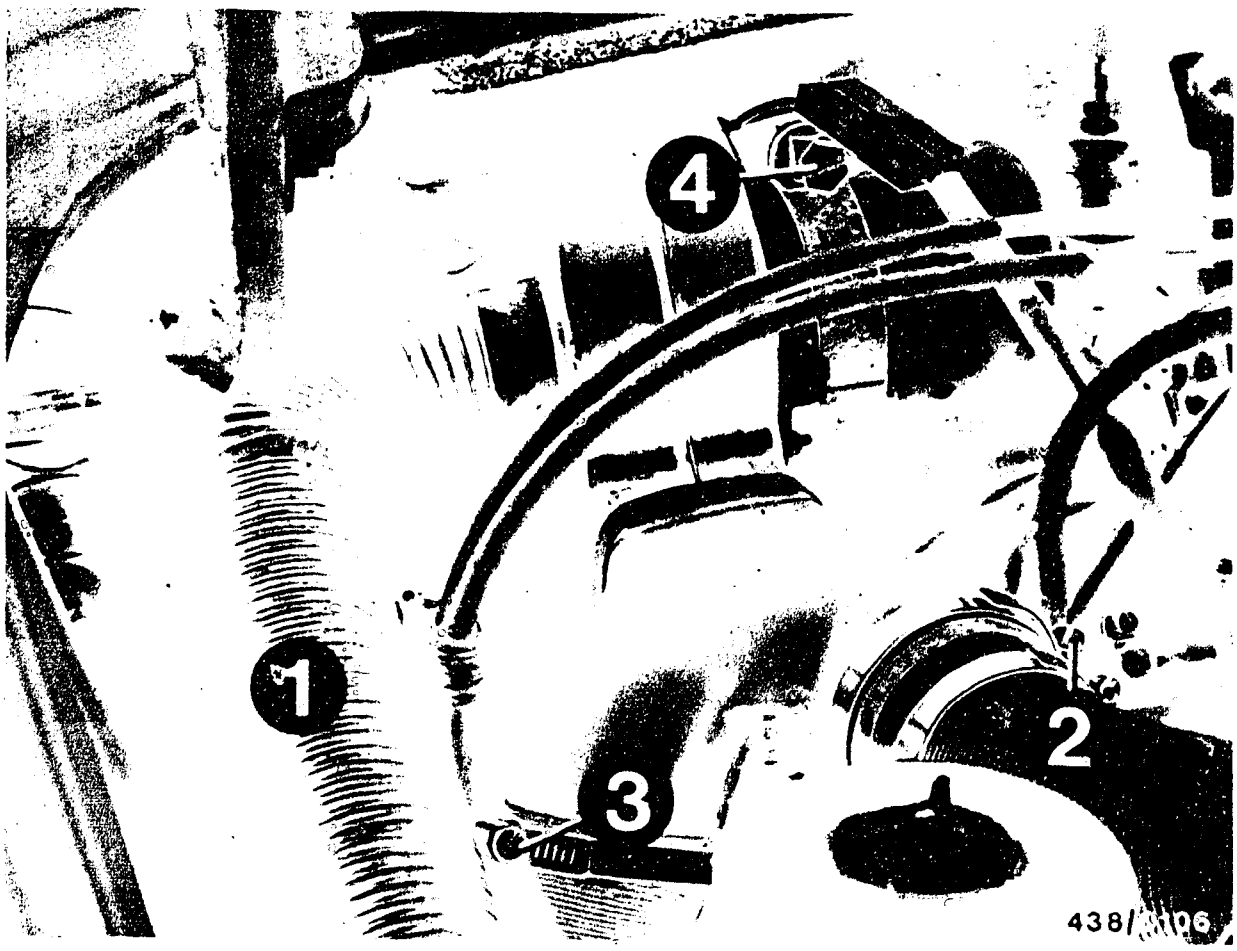
Finally, check the primary pressure and adjust if necessary by changing the shims.

Primary pressure
Fuel distributor 0 438 100 006, ... 010

Test value: 4.5...5.2 bar (4.6...5.3 kgf/cm^2 gauge pr.
Set value: 4.7...4.9 bar (4.8...5.0 kgf/cm^2 gauge pr.

Possible cause of trouble in the control-pressure circuit:

The fuel distributors 0 438 100 006 and ... 010 are versions without push-up valve.
The only possible cause of a leak in the control-pressure circuit is, therefore, the warm-up regulator.
Therefore, replace the warm-up regulator.



Removing and installing the warm-up regulator:

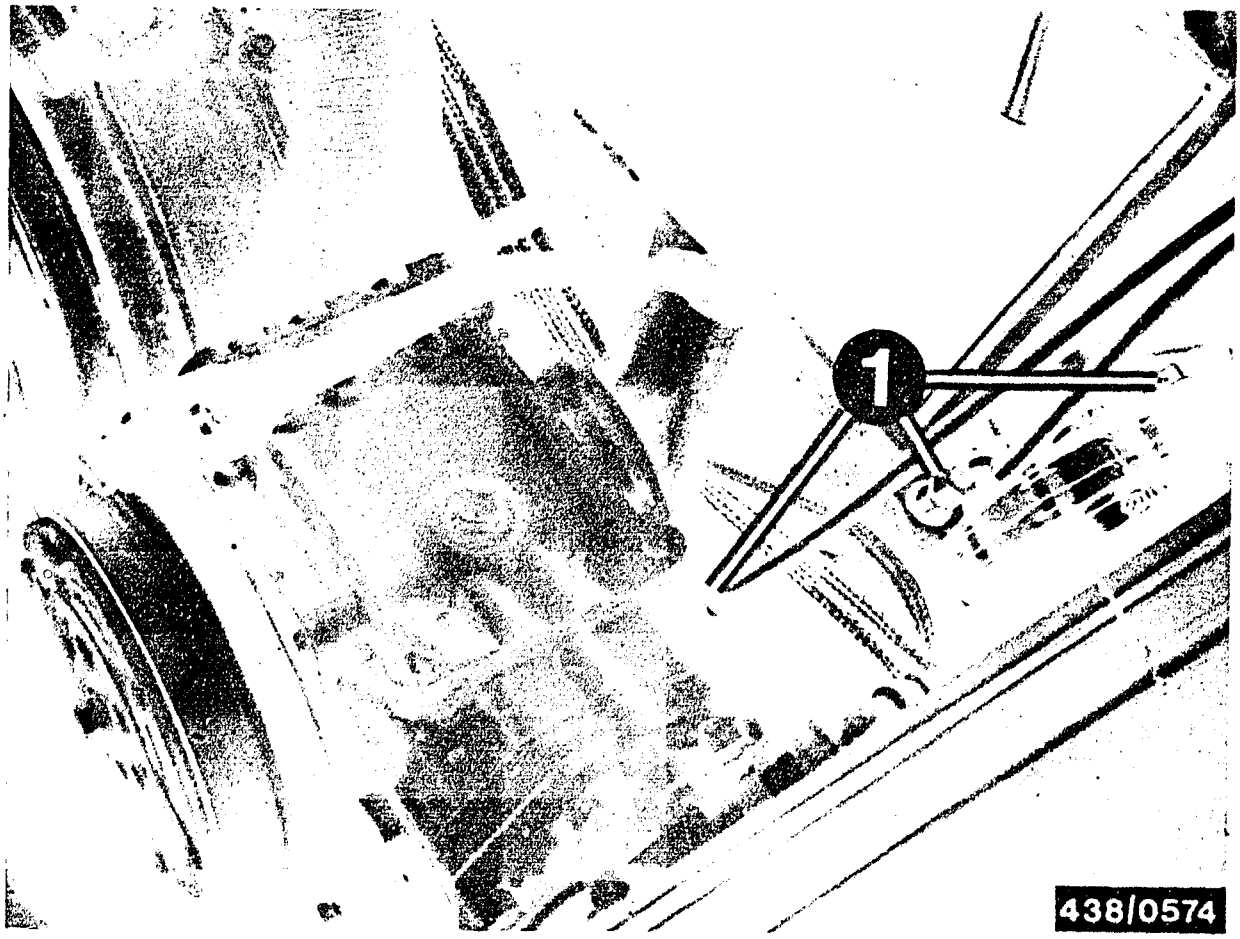
Before removing, dismantle the auxiliary-blower system as follows.

Remove intake hose 1 of the auxiliary blower.

Loosen the two hose clips 2 and 3 and remove the air hoses from the air distributor of the auxiliary blower.

Loosen clamping screw 4 of the blower motor and turn the motor with the air distributor upwards.

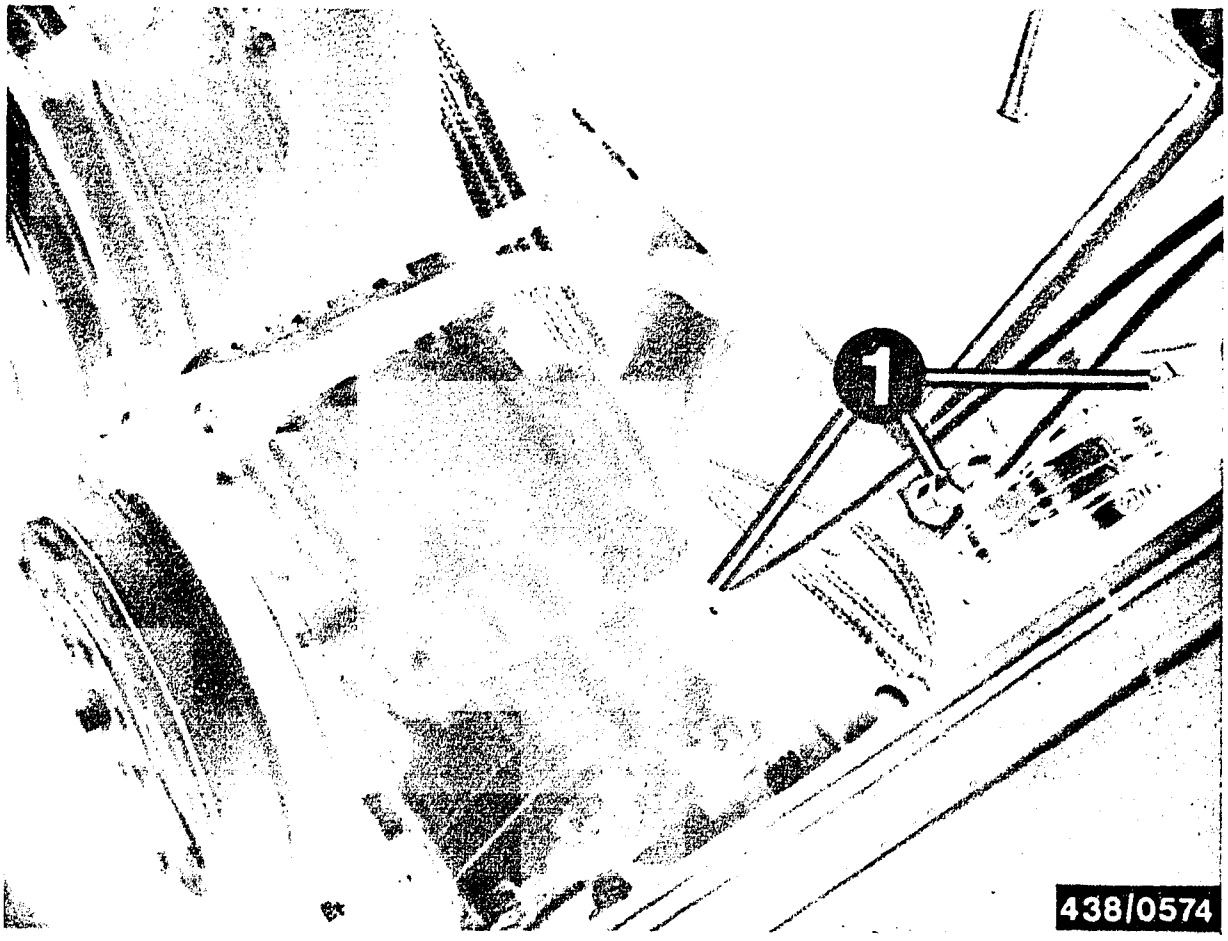
Replace the warm-up regulator and re-install the auxiliary-blower system in the reverse order.



17. Testing the injection valves

- Remove the injection valves:

The injection valves are plugged into the flanges of the intake tubes.
Unscrew the fuel-injection lines, applying counter-force at the fixed hexagonal section of the injection valves (1). Remove the injection valves from the holding sleeves (in the intake-tube flange), and, using a small screwdriver, lift out any of the rubber cup seals which remain in the holding sleeves.
Do not damage the holding sleeve when doing this (plastic).



• Installation:
Check the rubber cup seals for damage. Replace if necessary. Wet the rubber cup seals with engine oil and fit.

Force the injection valves as far as they will go into the holding sleeves. The rubber cup seal must be underneath the bead in the holding sleeves.

Re-connect the fuel-injection lines, applying counter-force at the fixed hexagonal section of the injection valves.

17.1 Test equipment and test media

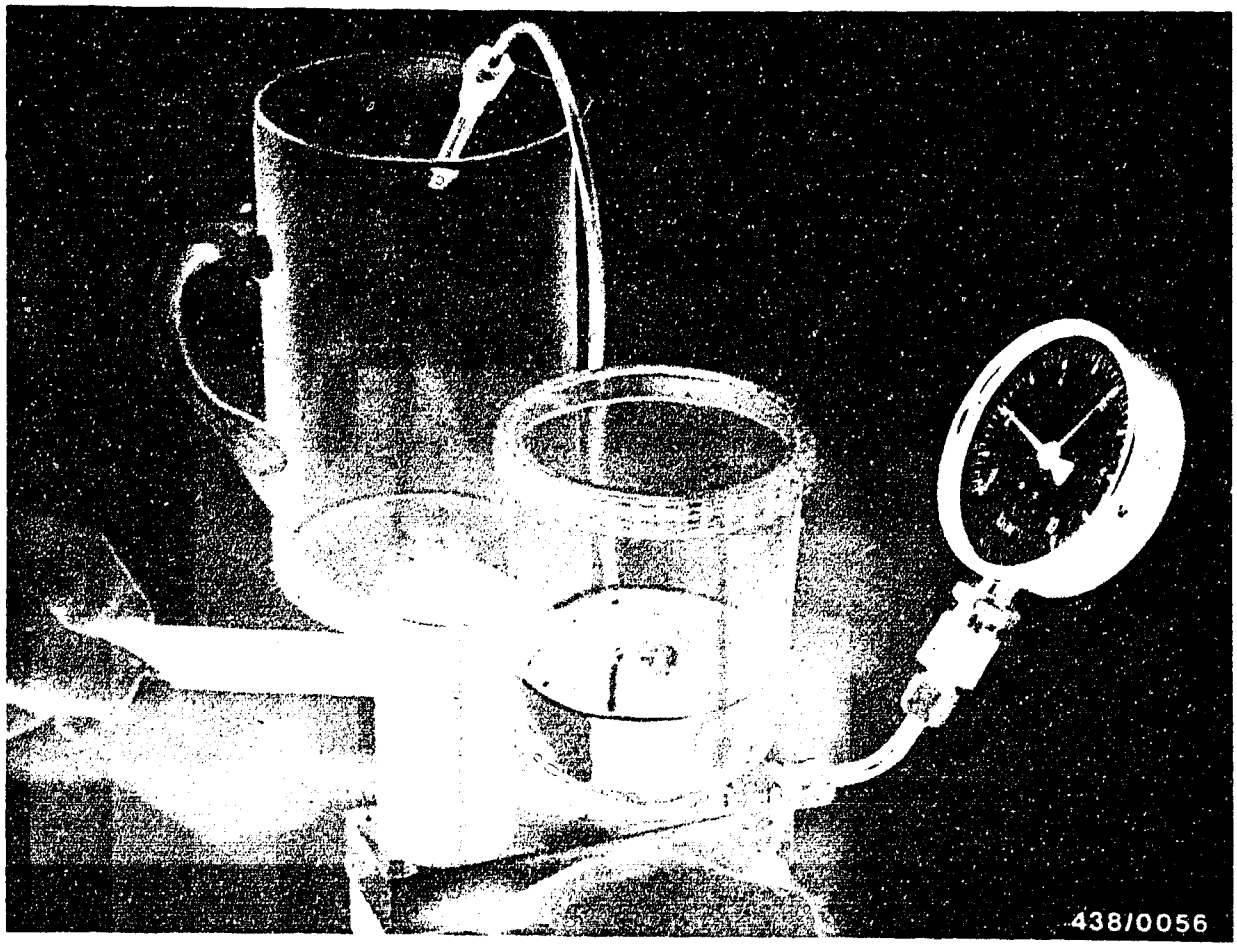
The following testing specification refers to valve testers KDJE-P 400 (previously KDEP 7452) and 0 681 200 700.

Observe the test-media specification!

Test media: Calibrating fluid (Shell K 30, Esso-Varsol, Shell Mineral Spirits 135)
or
Bosch, Part No. VS 14 942-CH
Former Part No. 5 973 340 650
The calibrating fluid can be obtained in 5 l metal cans from the following supplier:

Firma
Oskar Gnamm GmbH
D-7531 Kämfelbach-Bilfingen

Caution:
For safety reasons, never use normal gasoline or similar easily inflammable and combustible liquids.
Even with calibrating fluid, be sure to observe the local official regulations.

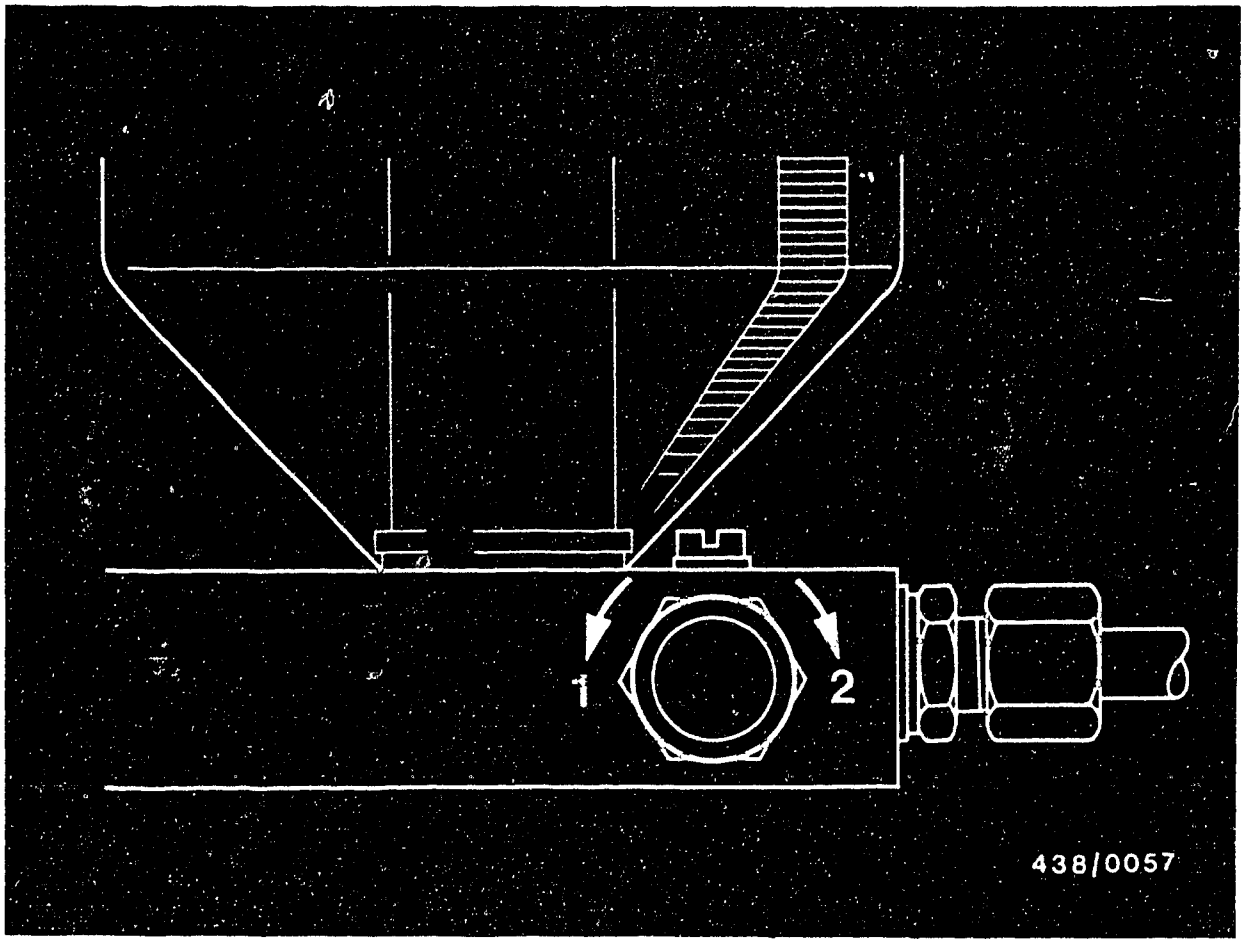


17.2 Connecting the injection valve to the tester

Connect the injection valve to the valve tester and bleed the delivery line by operating the lever several times with the union nut open. Ten tighten the union nut.

17.3 Checking for dirt

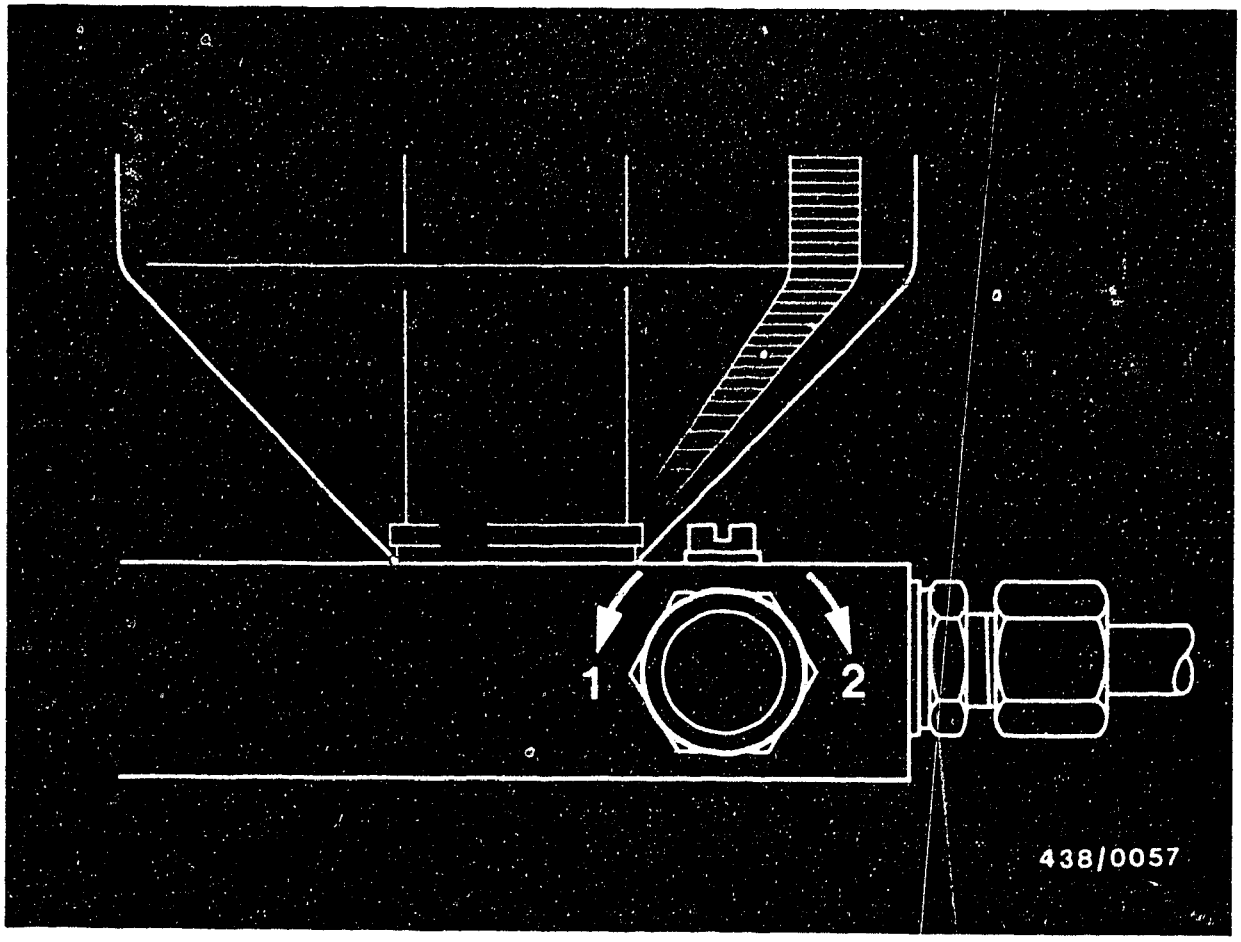
Move the hand lever slowly (about 2 seconds per stroke) back and forth with the stopcock on the pressure gauge open. If the pressure does not build up to 1...1,5 bar gauge pressure, the injection valve has a bad leak (caused, for example, by dirt stuck in it).
You can try to flush the injection valve clear by moving the lever back and forth several times strongly.
If this attempt is successful, continue the test. If it is not possible to flush the valve clear, replace it.



1 = Open 2 = Close

17.4 Testing the opening pressure

Injection valve Part No.	Test specifications - opening pressure (gauge pressure)
0 437 502 004	2.5...3.6 bar (2.6...3.7kgf/cm²)



With the stopcock closed, flush the valve out and bleed it with several rapid movements of the lever.
Open the stopcock and test the opening pressure by moving the lever slowly (about 2 seconds per stroke).

If the opening pressure is outside tolerance, replace the injection valve. Individual valves can also be interchanged within a set.

17.5 Leakage test

Open the stopcock, build the pressure up slowly to a value 0.5 bar under the opening pressure determined previously (but not less than 2.3 bar gauge pressure), and hold it constant at that level. No drops must now fall from the valve for the next 15 seconds.

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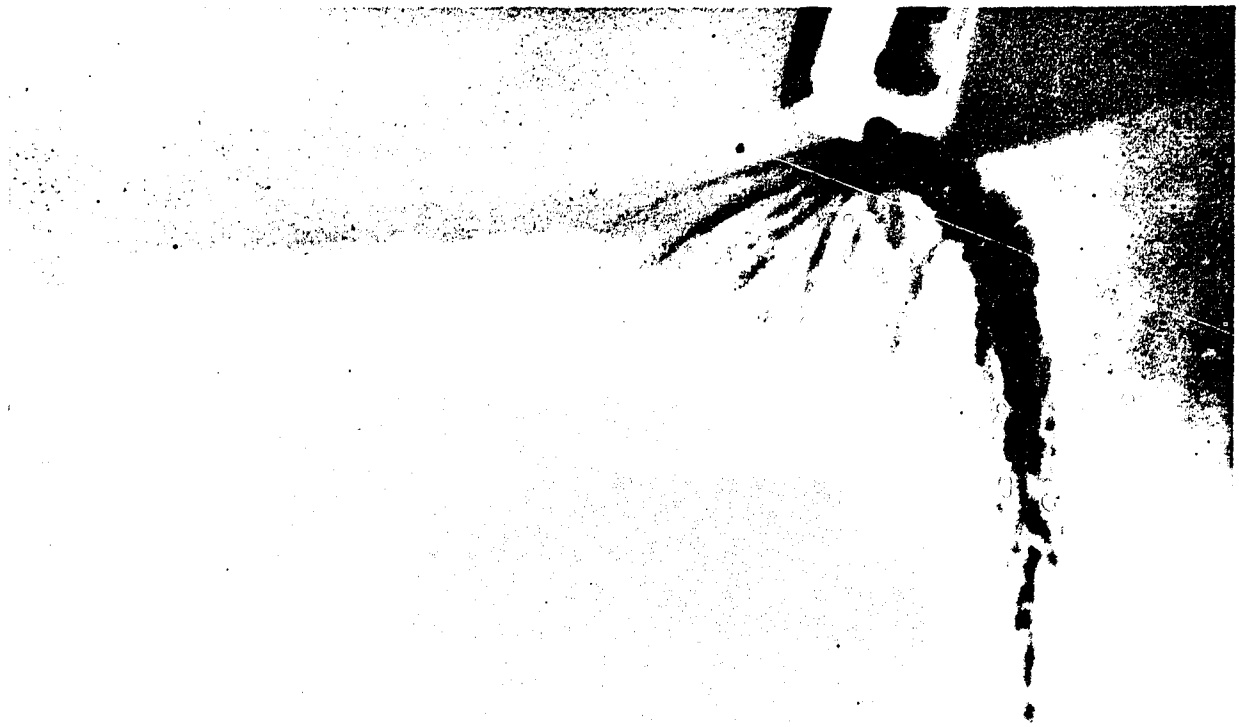
17.6 Chatter test, evaluation of spray

Move the lever back and forth at about 1 stroke per second. As this is done, the valve must chatter. No drops of fuel must form at the mouth of the valve. The valve must not produce a "cord spray". Formation of a single-sided, atomized spray within an overall spray angle of about 35° is permissible (see example given in illustrations).

Illustration shows good spray formation.

438/0059

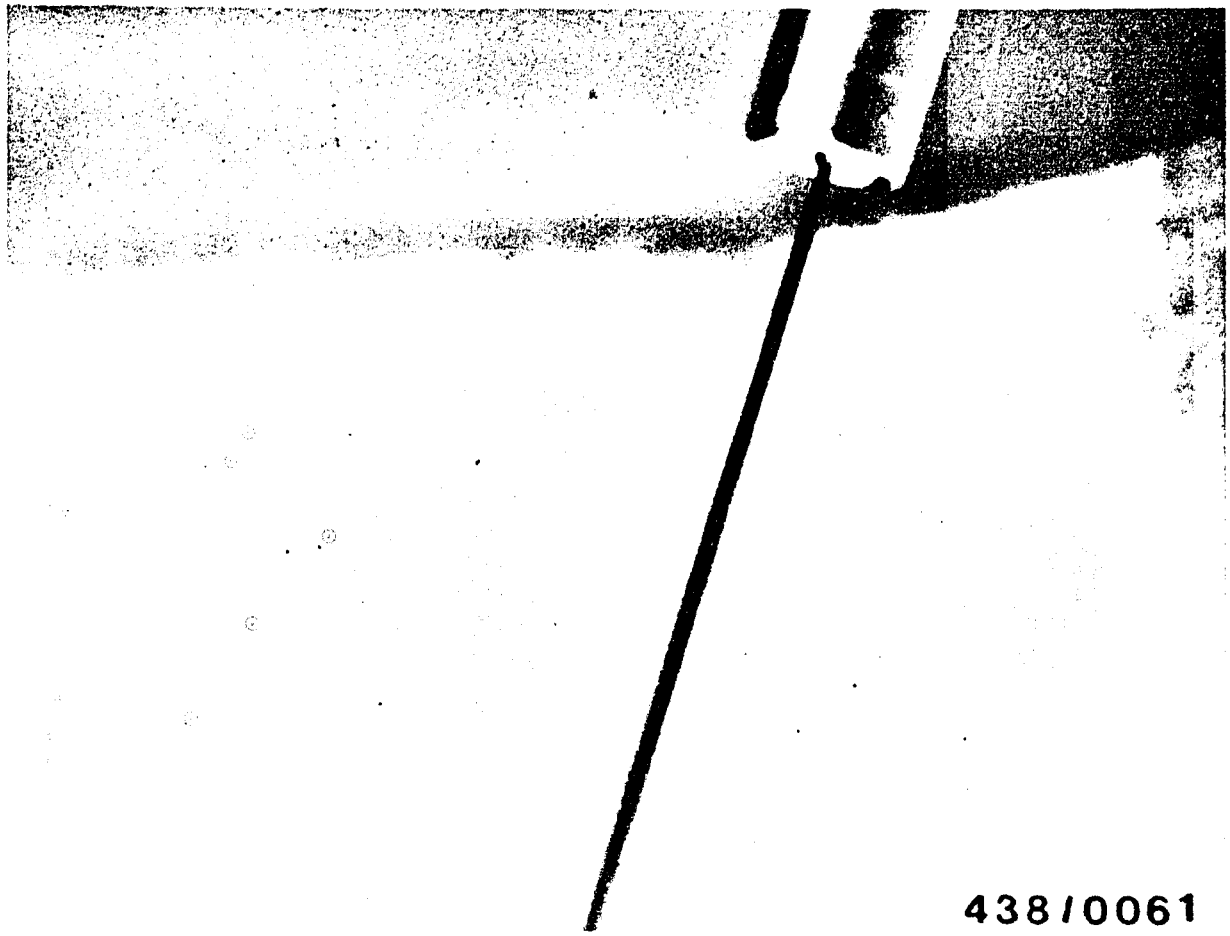
Illustration shows single-sided but nevertheless good spray formation.



438/0060

Poor spray formation; replace injection valves.

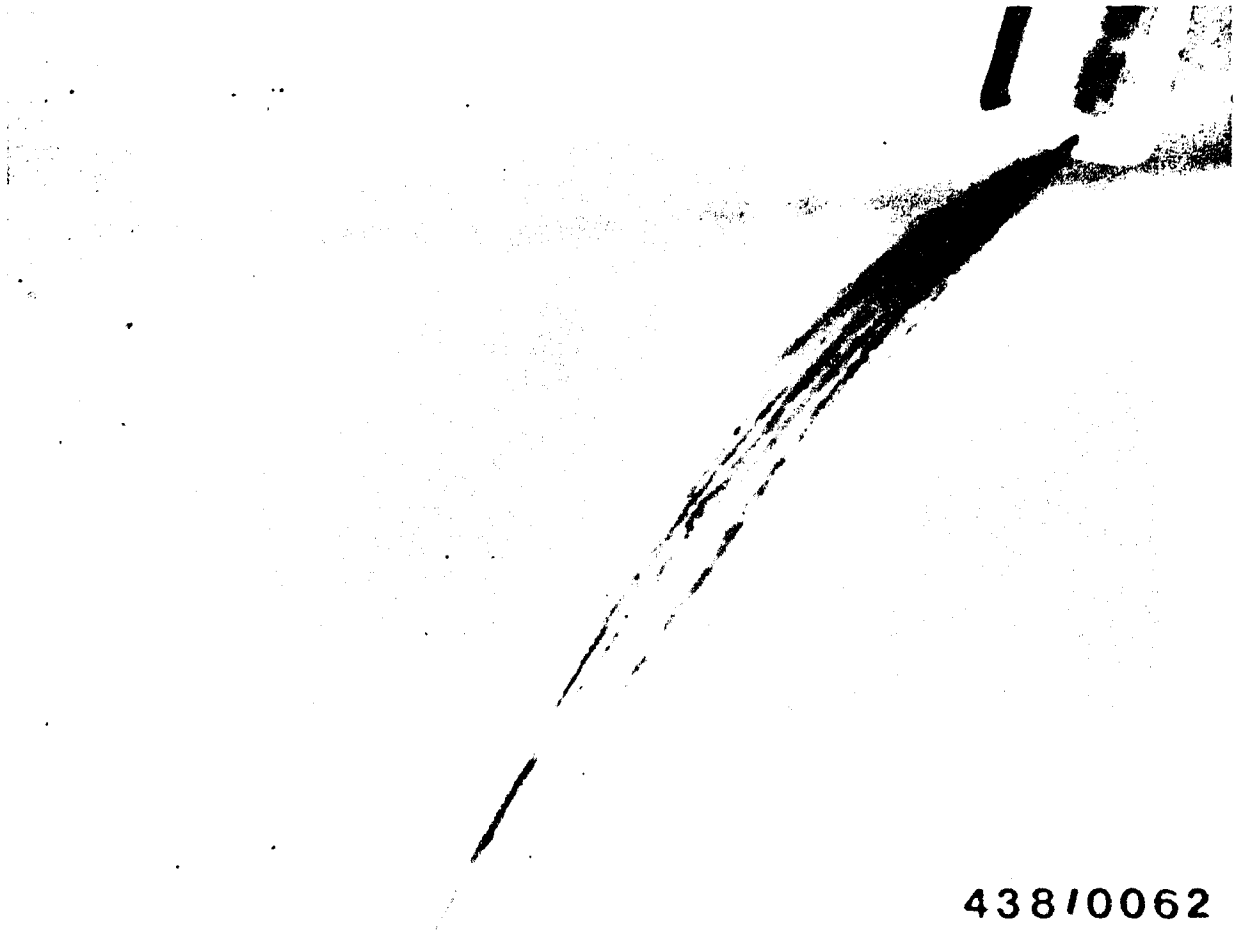
Illustration shows drop formation.



438/0061

Poor spray formation; replace injection valves.

Illustration shows "cord" spray.



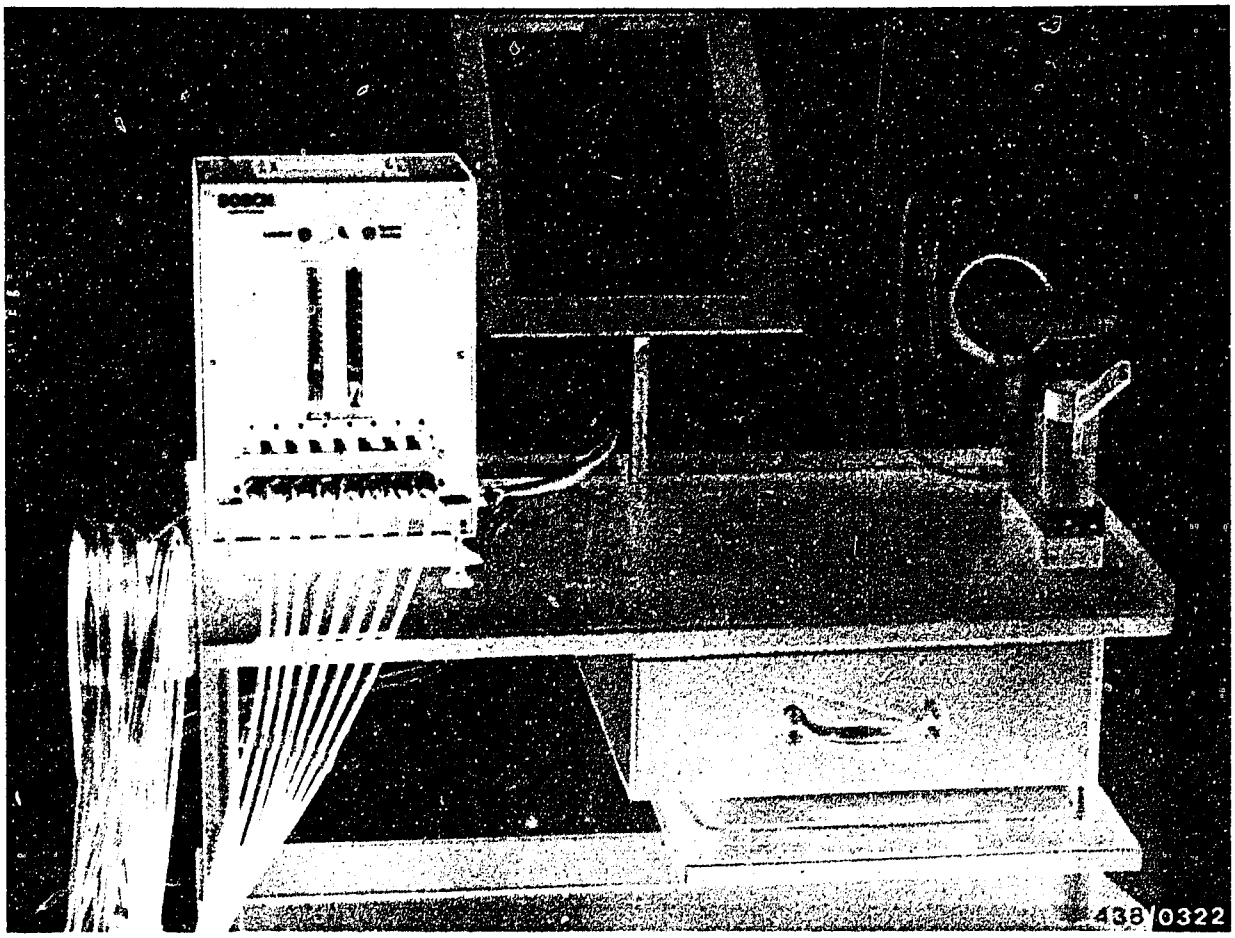
438/0062

Poor spray formation; replace injection valves.

Illustration shows "spray in strands".

If defective injection valves have been replaced, it is necessary finally to adjust the idle speed with the engine at normal operating temperature.

Idle-speed adjustment is described on Coordinates F 16.

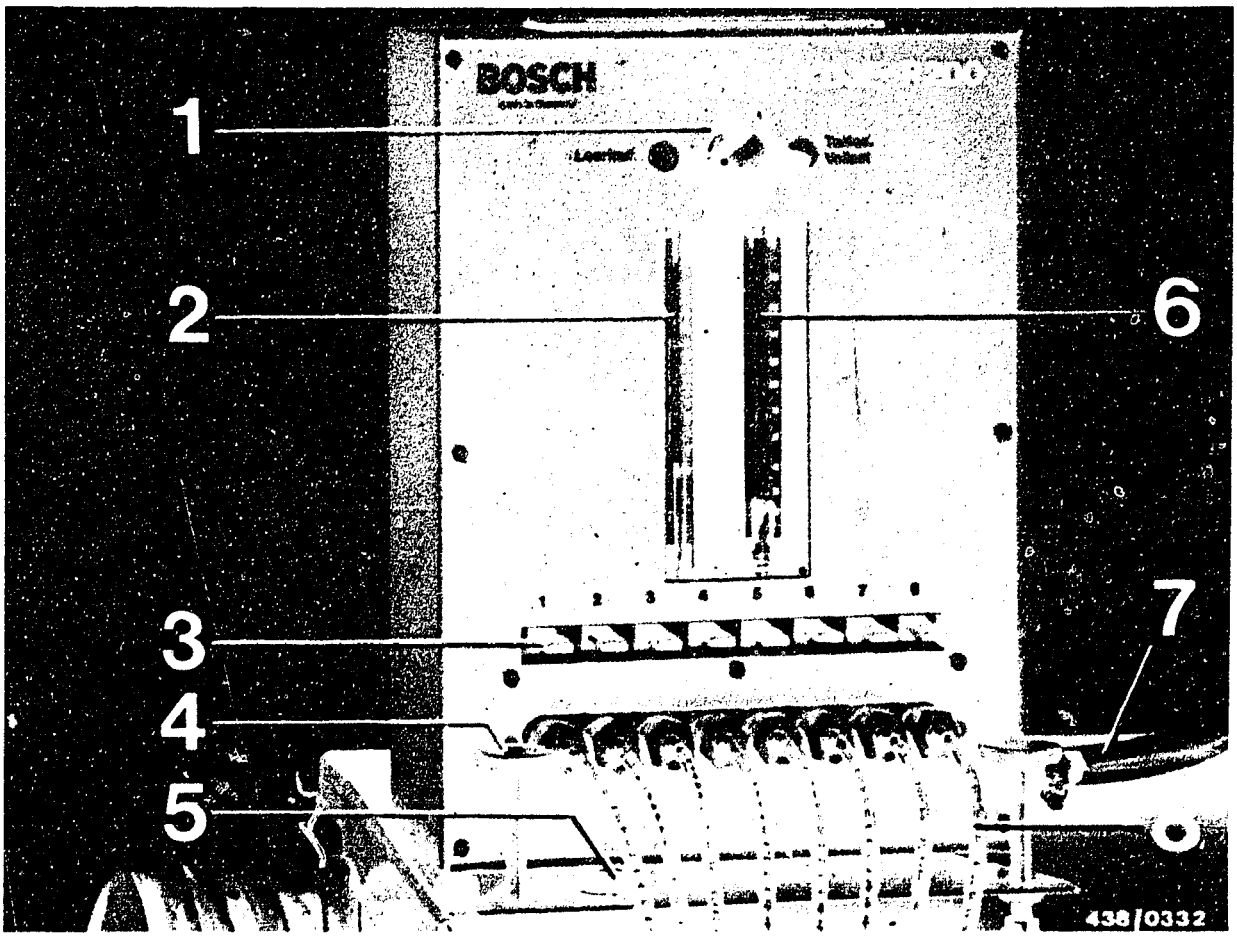


18. Comparative measurement of fuel delivery of fuel distributor outlets.

This test is carried out using the tester for delivered quantity comparison KDJE-P 200 (previously KDJE 7451).

18.1 Application

By means of comparative measurements, the differences in the amounts of fuel delivered from the individual outlets on the fuel distributor are determined.
The tester is designed so that the test can be made on the vehicle without having to remove the fuel distributor.
Since the test is made with the original injection valves, the operator can recognize at the same time whether delivered-quantity scatter, if it occurs, is caused by the fuel distributor or by the injection valves.



1 = 3-way cock
2 = Small rotameter tube
3 = Keyboard for 8-way valve
4 = Adjusting screw for setting up
5 = Spirit level
6 = Large rotameter tube
7 = Return hose
8 = Polyamide hose lines (test lines)

18.2 Construction

The tester is designed for use with all engines, up to 8 cylinders, equipped with K-Jetronic.

Basically, the tester consists of a steel housing containing 2 rotameter tubes with measuring ranges of 2...15 cm^3 and 10...180 cm^3, an 8-way valve for key operation (Item 3) and a 3-way stopcock (Item 1).

The small rotameter tube (Item 2) is used for the idle measurement while the large tube (Item 6) is used to measure the fuel delivery at part- and full-load.

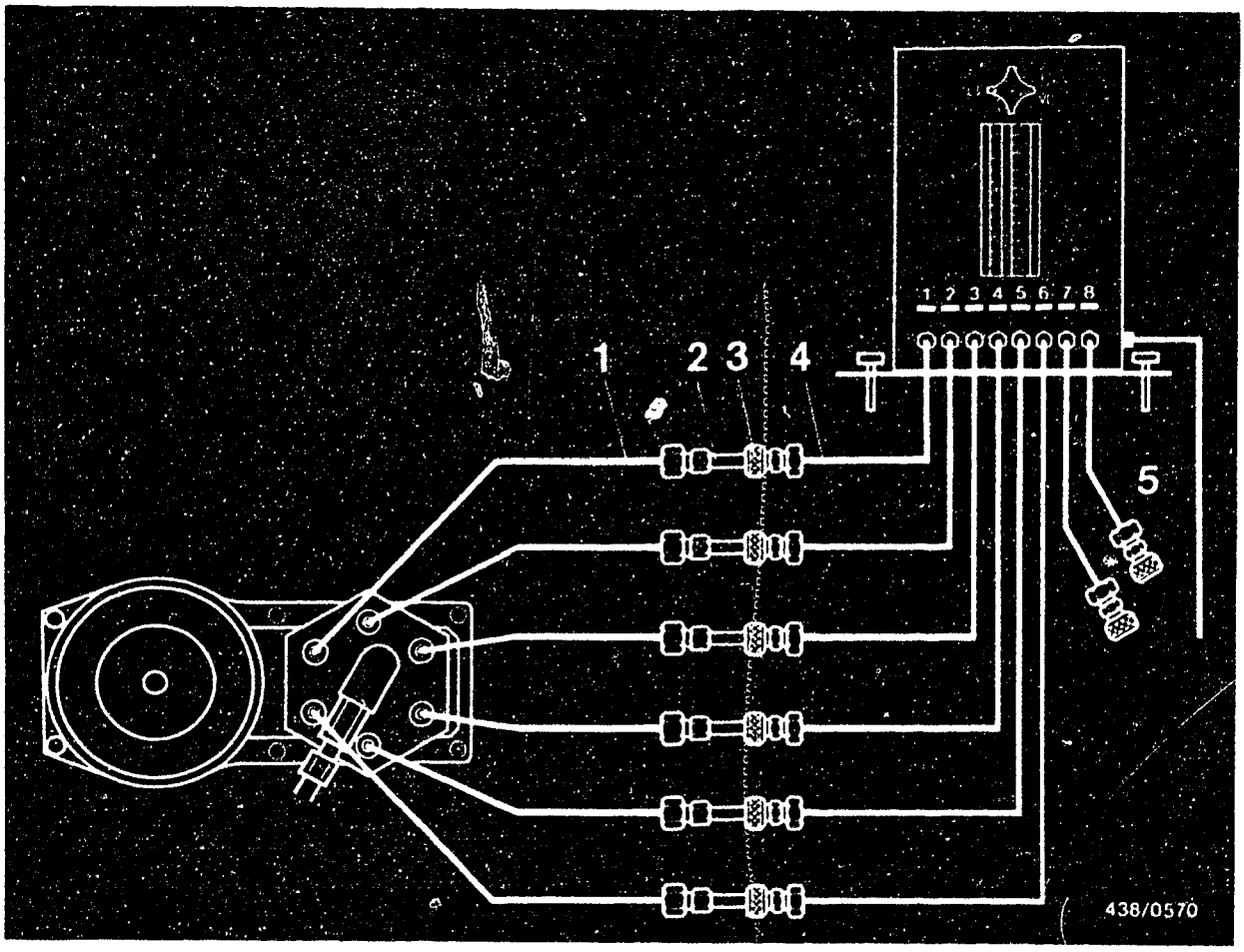
The particular rotameter tube to be used is connected by means of the 3-way stopcock.

Using the 8-way valve, the fuel delivery of each cylinder is tested one after the other.

Attached to the tester are 8 hoses (Item 8), each terminated with an automatic connector. When the injection valves are withdrawn from their sockets on the engine they are attached to these connectors. Each automatic connector is fitted with a push valve so that no fuel can escape from connectors that are not in use (when 4- or 6-cylinder systems are tested).

The fuel is returned to the fuel tank through a hose (Item 7) about 5 m long.

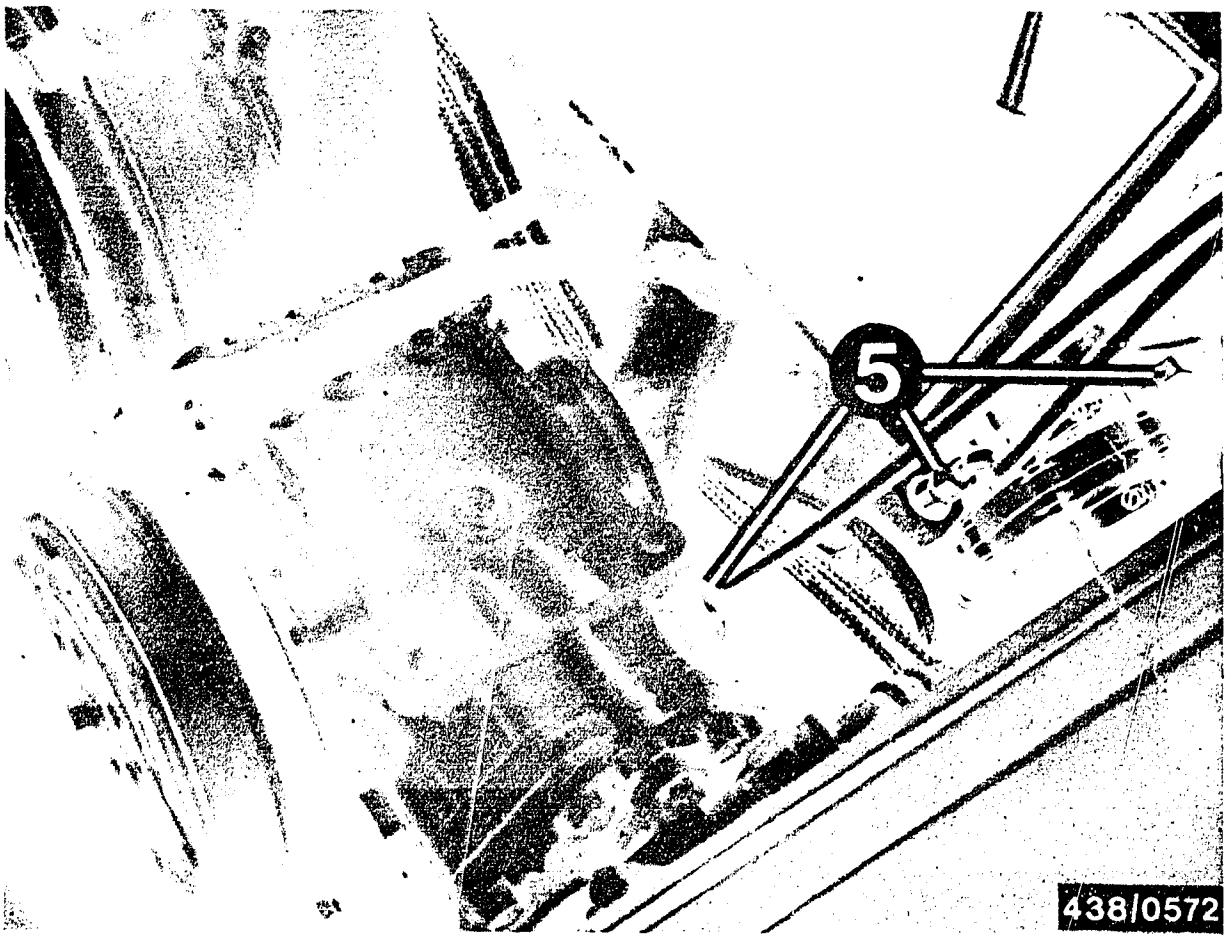
The entire test is made with a closed circuit, i.e. no fuel escapes.



1 = Fuel-injection tubing of fuel distributor
2 = Injection valves
3 = Automatic connectors
4 = Tester hoses
5 = Return line to fuel tank filler neck

18.3 Setting up and connecting the tester:

Set the tester up beside the vehicle on a solid base (e.g. on tester trolley KDJE-W 100) and align it with the built-in spirit level (water lever at base of the tester).

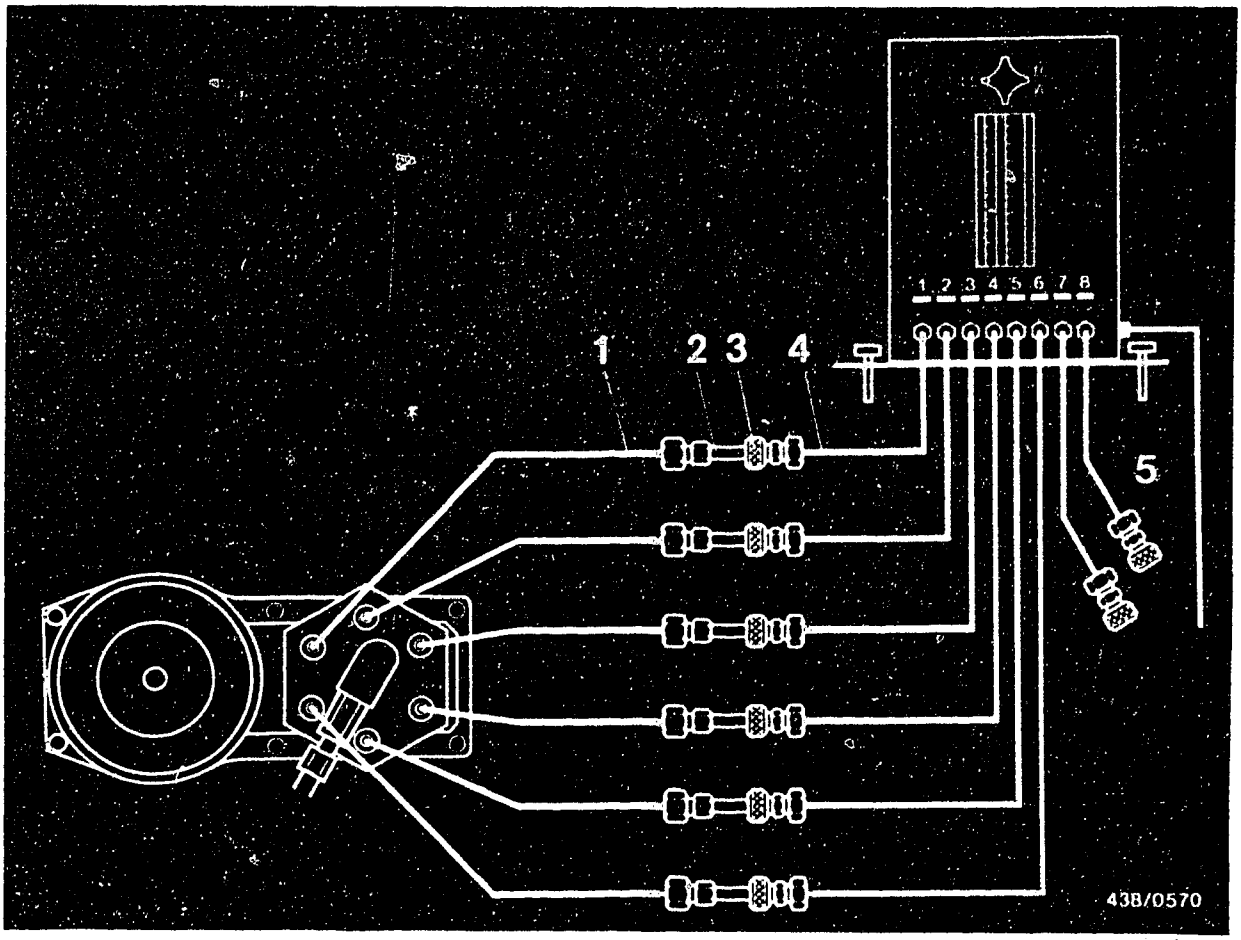


Remove the injection valves (5) for testing. They are plugged into the flanges of the intake tubes.

Note the following information when removing and installing:

The injection valves are removed with the fuel-injection lines connected.

Remove the injection valves from the holding sleeves (in the intake-tube flange), and, using a small screwdriver, lift out any rubber cup seals remaining in the holding sleeves. Do not damage the holding sleeves when doing this (plastic).



Clean the injection valves with a cloth and plug in the correct order into the automatic connectors of the first six tester hoses.

Note:
Plug in the injection valves firmly as far as they will go and tighten the knurled nuts securely so that the non-return valves of the automatic connectors are completely open. Introduce the return hose of the tester into the fuel tank filler neck.

18.4 Bleeding the tester:

Remove the rubber hood so that air-flow sensor plate becomes accessible.

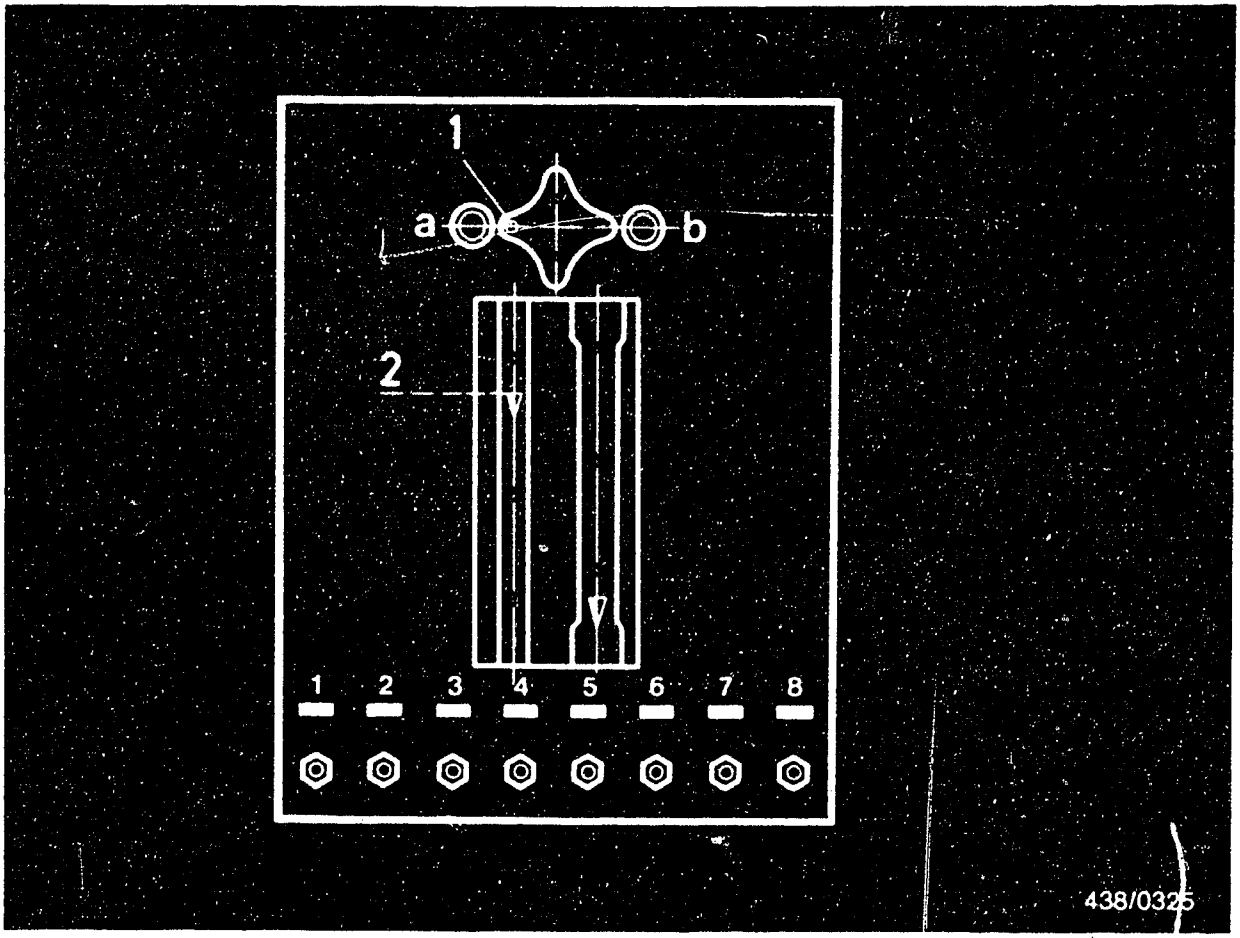
Remove the electric plugs from the warm-up regulator and the auxiliary-air device.

Switch on the electric fuel pump by bridging the electrical safety circuit.

Raise the air-flow sensor plate to the stop.

Press the keys on the 8-way valve one after the other, while simultaneously switching the 3-way stopcock until both rotameter tubes are bled.

Return the sensor plate to the rest position.

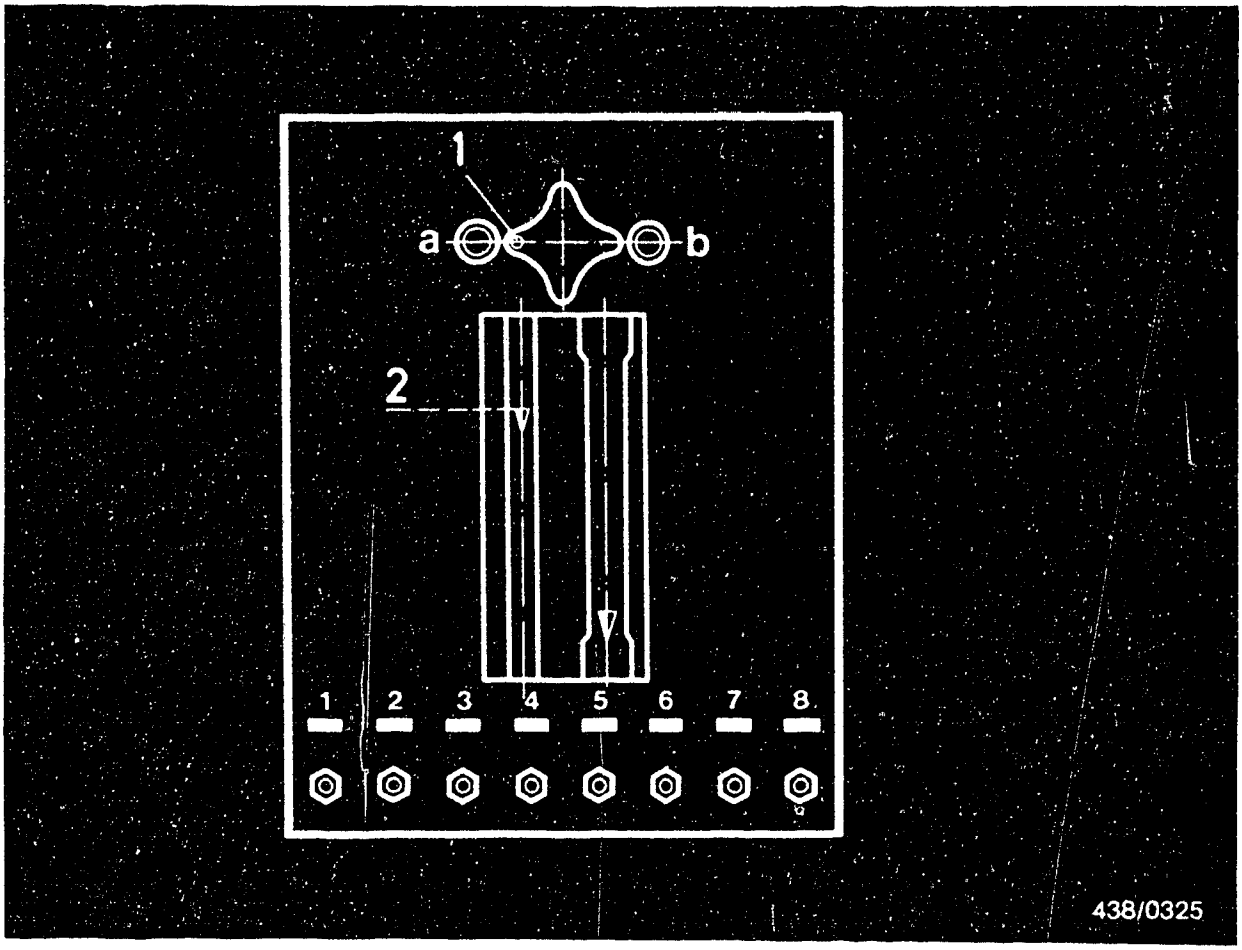


1 = White dot
2 = Measuring line

a = Idle
b = Part load/full load

18.5 Testing

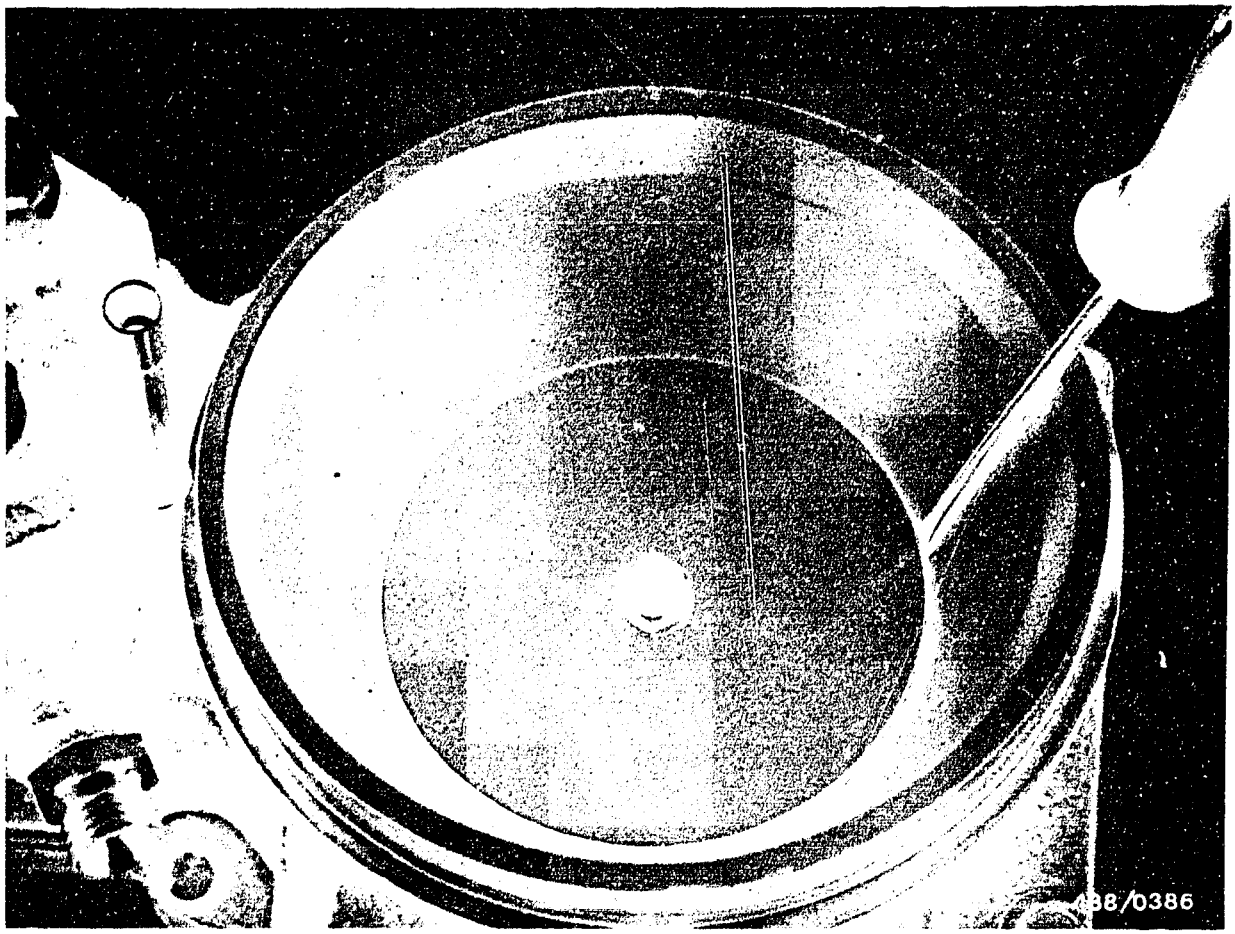
The flow comparison measurement is made in the idle, part-load and full-load ranges.
The small rotameter tube is to be used for the idle measurement (white dot to the left on control knob); part-load and full-load measurements are made using the large rotameter tube (white dot to the right).



1 = White dot
2 = Measuring line

a = Idle
b = Part load/full load

The delivered quantities indicated on the rotameter tubes are read off at the top edge of the conical float (Item 2). On testers with a ball float the uppermost point of the ball is used for reading off. With each measurement be sure to wait until the float has reached its final position. This may take 20 ... 30 seconds in the case of small deliveries.



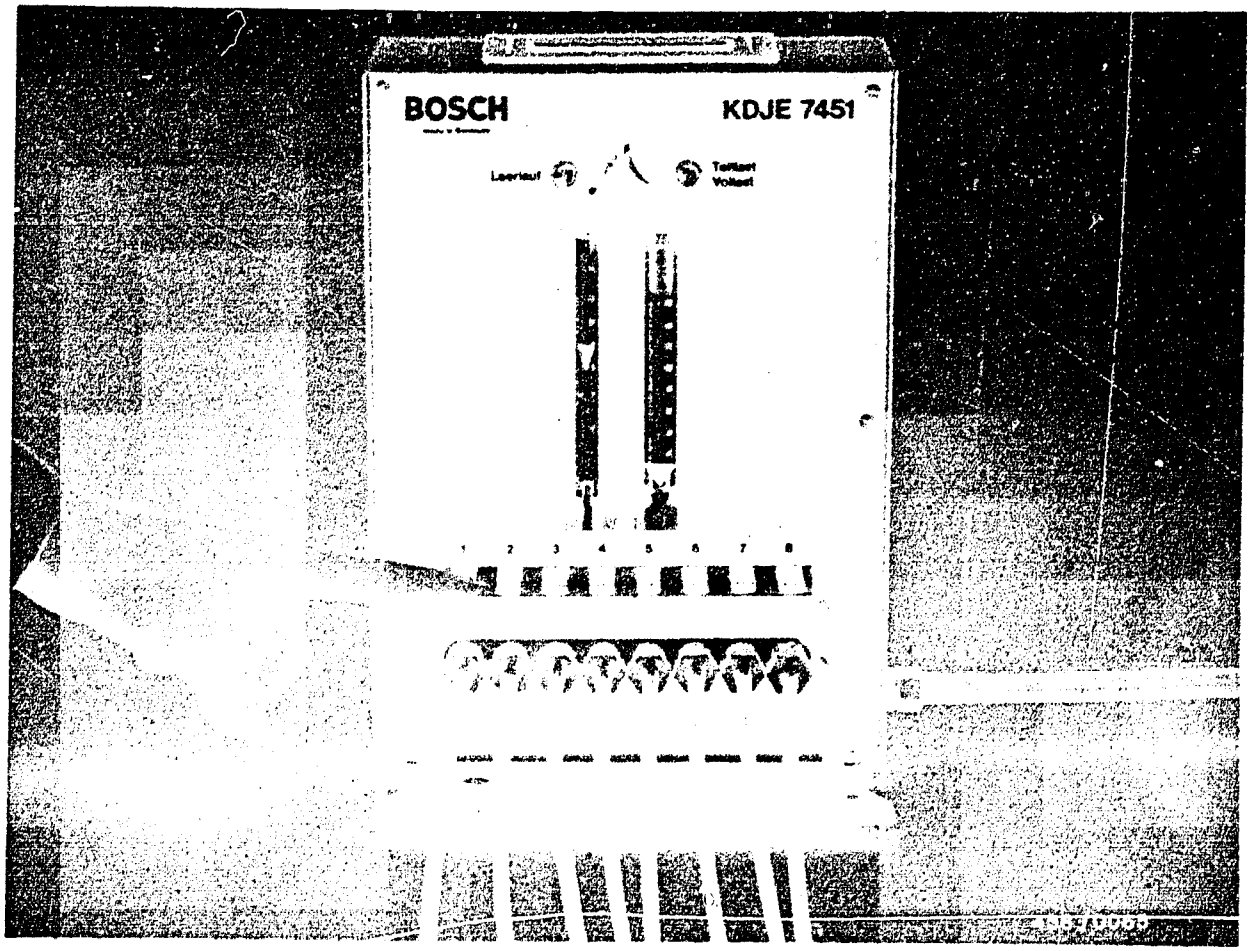
The exact setting and locating of the position of the air-flow sensor plate for the various load ranges is done using a screwdriver (a small one for the idle position), which is inserted to an appropriate depth between the air funnel and air-flow sensor plate.

Procedure:

Switch on the electric fuel pump by bridging the electrical safety circuit.

Fixed numerical values are specified in the following test section for the maximum permissible fuel delivery differences for the individual load ranges.

The "setpoint" value always pertains to the fuel-distributor outlet with the lowest fuel delivery, i.e. in each case the outlet with the lowest delivery is to be first ascertained.



Press the key for outlet 1. Pivot the air-flow sensor plate until the corresponding rotameter tube approximately indicates the "set point" value. Fix the air-flow sensor plate in this position.

Test the remaining outlets in order to determine which outlet has the lowest fuel delivery.

Press the key for this outlet again, and set the delivery precisely to the "set point" by correcting the position of the air-flow sensor plate. Then fix the air-flow sensor plate in this position again.

Press the remaining keys one after the other, and determine the maximum fuel delivery of each outlet. A deviation in fuel delivery can only be above the "set point".

18.6 Test specifications

	Set point (cm^3/min)	Max. permissible fuel delivery (cm^3/min)
Idle	6.0	6.8
Part load	40.0	44.0
Full load	140.0	153.0

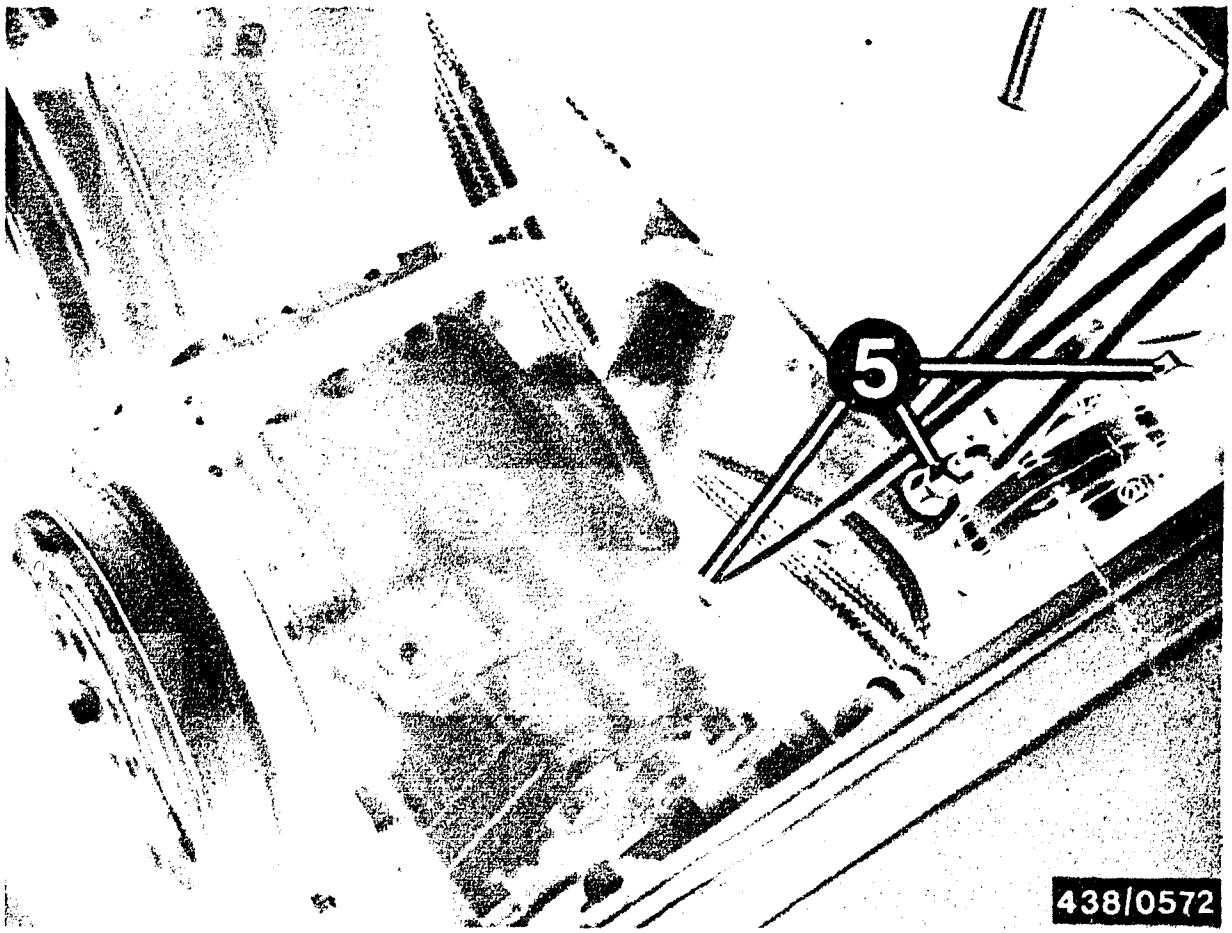
If, in testing, a too large difference is ascertained in one of the three load ranges, the test should for safety's sake be repeated.

If the result is confirmed, you should check whether the fault lies in the fuel distributor or in the injection valves.

To do this interchange the injection valves with the greatest and smallest difference.

If the result is still the same, the fault is in the fuel distributor. If the fault follows the interchanged injection valves, it lies in the injection valves.

Change defective fuel distributor and/or replace defective injection valves.



Re-fitting the injection valves properly

Check the rubber cup seals for damage. Replace, if necessary. Wet the cup seals with engine oil and fit.

Force the injection valves as far as they will go into the holding sleeves. The rubber cup seal must be below the bead in the holding sleeves.

Re-connect the fuel-injection lines, applying counter-force at the fixed hexagonal section of the injection valves.

18.7 Final operations

Re-fit the rubber hood. Make sure that all lines are laid correctly.
Re-connect the electrical safety circuit of the K-Jetronic properly.

Use a trial run to check that there are no leaks in line connections.

Finally check the idle-speed adjustment. If necessary, correct (see Coordinates F 16).

19. Idle-speed adjustment

19.1 Test conditions:

Warm the engine for adjusting the idle speed (oil temperature approx. 80°C).

Important note:

If the fuel-injection tubing or injection valves were loosened or removed, the engine should be warmed up under load. The low rate of fuel flow during idling is not always adequate to drive all the air out of the fuel-injection tubing.

The idle speed must not be adjusted when the engine is too hot, e.g. immediately after being raced or after a power measurement on the roller-type test stand.

In vehicles with an air-conditioner, this should be switched off to stabilize the engine speed during idle-speed adjustment.

Rotational-speed measurement with separate tester.

19.2 Idle adjustment (test specifications)

Idle speed:

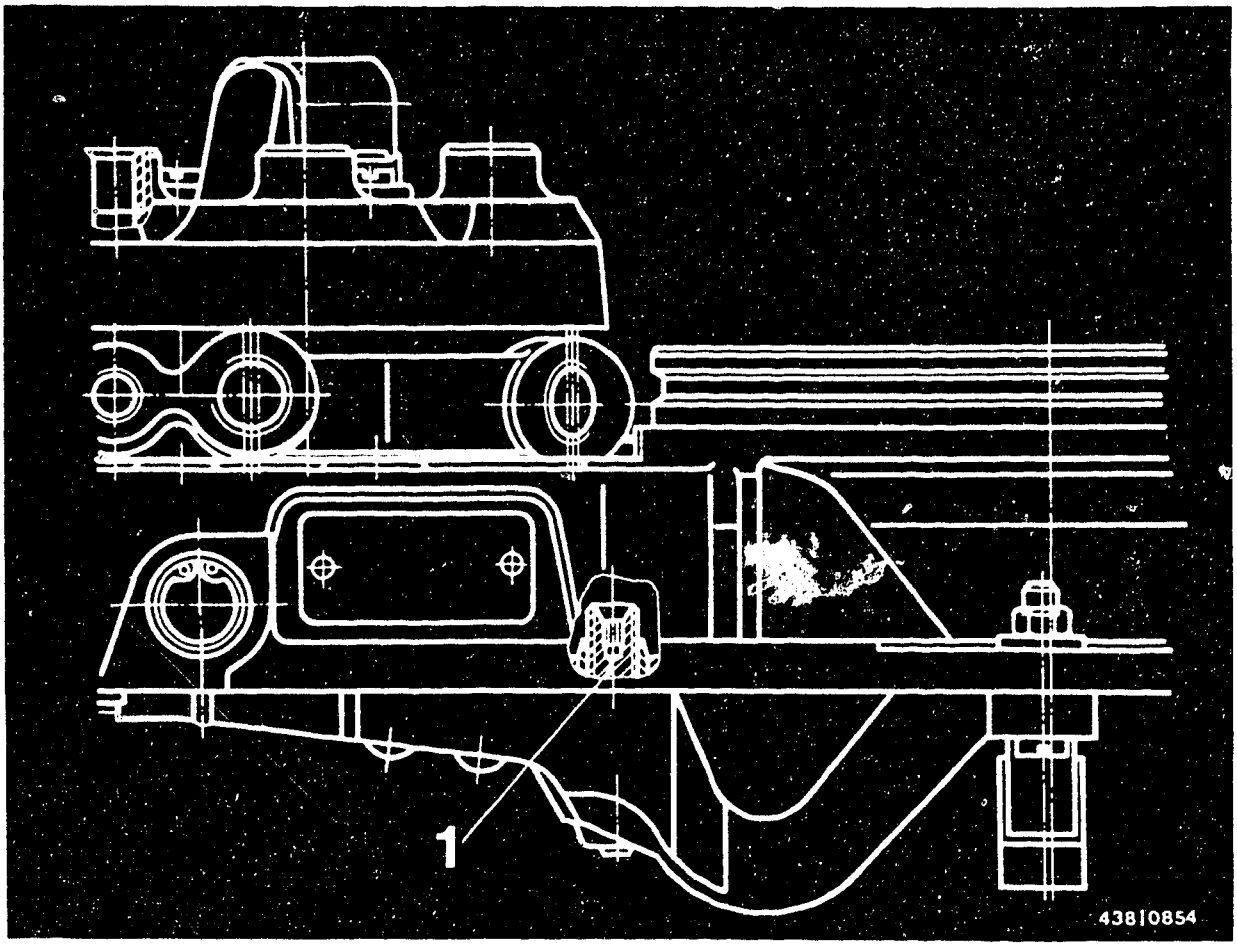
with manually-shifted transmission:	850...950 min^{-1}
with Sportomatic:	900...1000 min^{-1}

CO concentration:

All models:	1.0...1.5 % by vol. CO

19.3 Adjustment:

Adjust the idle speed at the bypass screw in the throttle-valve assembly (arrow).



Adjusting the CO concentration

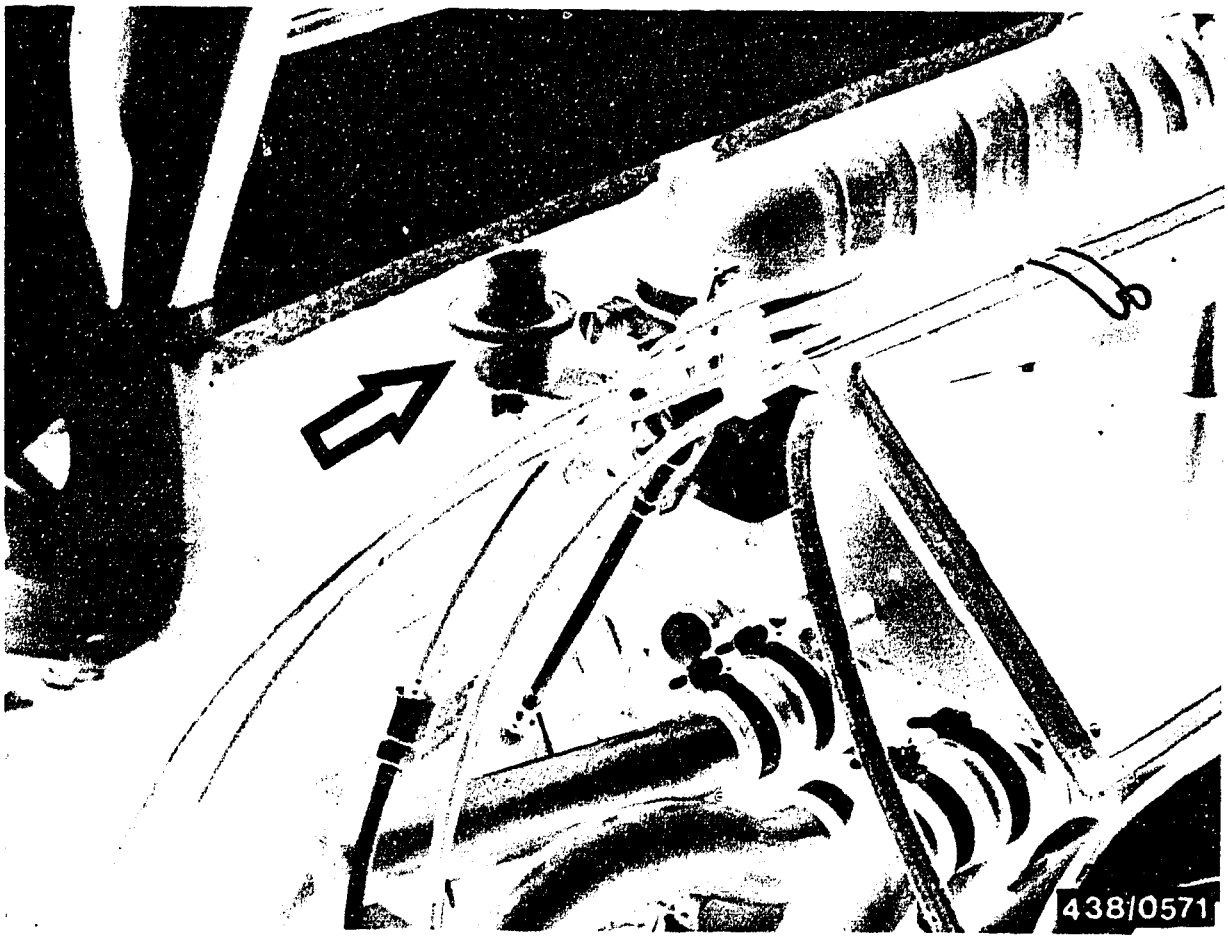
Adjust the CO concentration by turning the idle-mixture-adjusting screw (1) in the mixture-control unit with the aid of the setting wrench KDEP 1035.

After removing the rubber plug in the housing bore in the air-flow sensor, the setting wrench is introduced through the bore and inserted into the idle-mixture-adjusting screw.

Turning in a clockwise direction: enriches the mixture
Turning in a counterclockwise direction: leans the mixture

Caution:
Always make the adjustment from the lean side, i.e. if the mixture is too rich turn the idle-mixture-adjusting screw further to the left than necessary and then turn it to the right up to the setting required.

After every adjustment remove the adjusting wrench and accelerate the engine briefly, so that the air-intake system can cool off. Then wait until the indicator of the CO tester has stabilized. Never accelerate the engine with the wrench still in place as this could result in bending the control lever in the air-flow sensor.

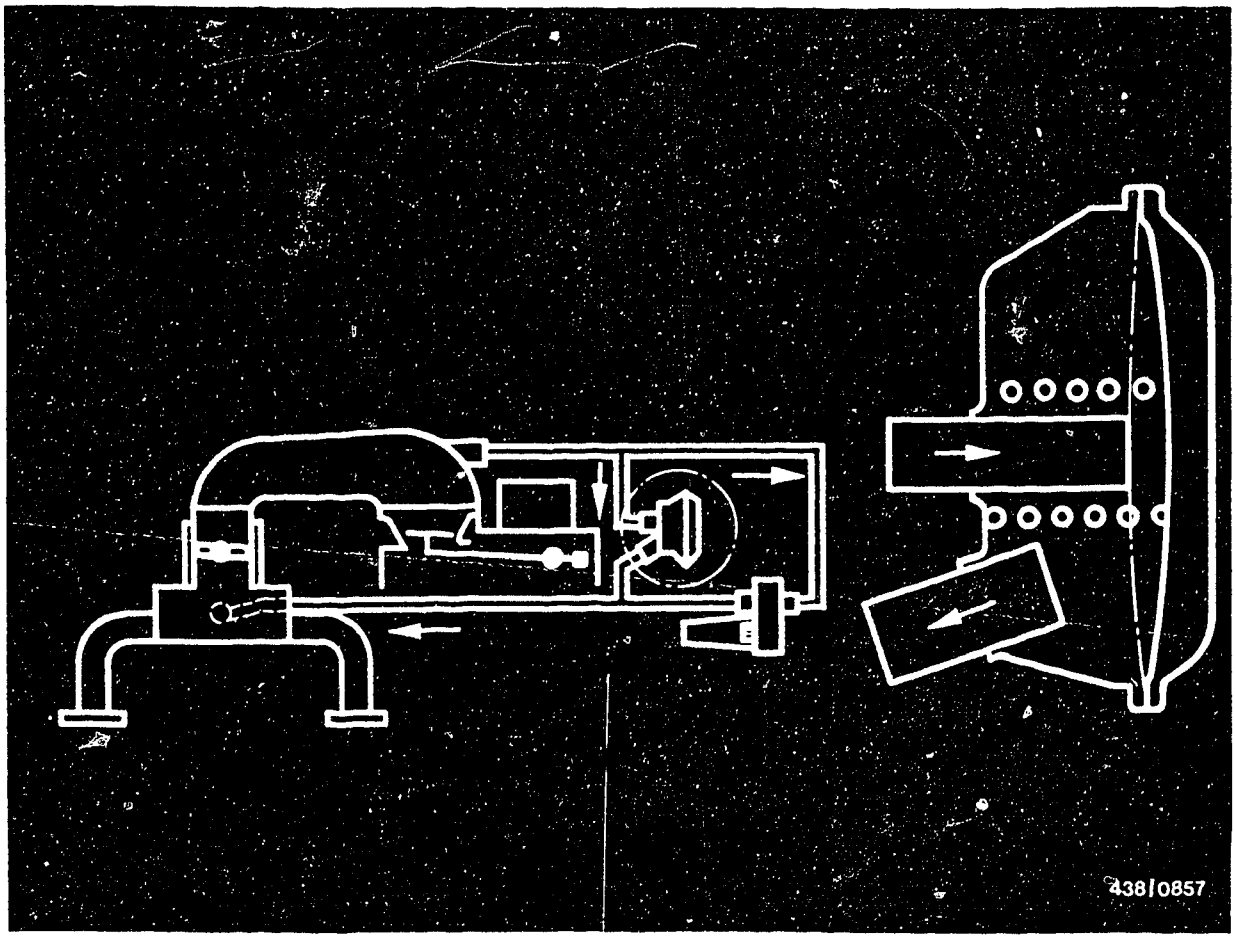


19.4 Vacuum limiter:

The vacuum limiter (arrow) is a vacuum-controlled auxiliary-air device which opens only on the overrun. In all other operating conditions the vacuum limiter must be sealed tight.
It can be checked as follows:
Measure the idle speed with the vacuum limiter closed (engine at normal operating temperature). Then switch off the engine.

Remove the hose connection before the throttle valve on the throttle-valve assembly and seal off tightly hose and tailpiece. Start the engine again and measure the idle speed. It must not differ from the previous measurement. If the speed has dropped, the vacuum limiter has a leak.

If it is leaking badly, the idle speed is too high and can no longer be adjusted.
Replace the vacuum limiter if leaking.
If the vacuum limiter has had to be replaced, subsequently check or repeat the idle adjustment (Coordinates F 16).



Checking the auxiliary-air valve

The auxiliary-air valve is mounted behind the intake housing on the right-hand side as viewed from behind the vehicle.

This valve opens briefly when the engine is being started and is closed at idle and at part load. At heavy load and in the full-load range the valve is open. It is controlled by the vacuum acting on the diaphragm.

Performing the test

Measure the idle speed with the engine at normal operating temperature. Using flat-nose pliers, pinch off the air hose between air dome and auxiliary-air valve directly before the auxiliary-air valve so as to stop the flow of air. If the idle speed thereby drops, the auxiliary-air valve has a leak. If it is leaking badly the idle speed is too high and can no longer be adjusted.

Replace the auxiliary-air valve if leaking.

After-sales Service

Technical Bulletin

Packaging of goods under warranty

438

K-Jetronic (CIS)

VDT-I-438/101 B
10.1976

All components or assemblies of the K-Jetronic which are dispatched under warranty must be correctly and carefully packaged so that no further damage or impairments occur during transit, since these would not be covered by warranty.

Any fuel remnants must be removed from those K-Jetronic assemblies intended for dispatch, so as to eliminate any danger of fire during transit.

The intake openings and outlets of the assemblies must be sealed off with caps or plugs. As new products were fitted, the caps or plugs from these may be used.

The plunger of the fuel distributor is to be fitted with a protective cap of adequate size, or secured to the fuel distributor.

In addition, the assemblies are packed in tightly packed, well-sealed plastic sleeves. Fuel distributors and warm-up regulators are packed individually.

If components arrive damaged due to incorrect packaging or do not comply with these instructions, they can be returned and the warranty claim rejected.

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After-sales Service

Technical Bulletin

EXCHANGEABLE NON-RETURN VALVES
in electric fuel pumps 0 580 254 ..

VDT-I-438/104 En
3.1982
(Replaces Ed. 9.1981

Electric fuel pump	Parts set (non-return valve + seal ring)	Non-return valve	Seal ring
0 580 254 001	1 587 010 500	---	---
.. 002	.. 500	---	---
.. 950	1 587 010 006	---	---
.. 951			
.. 952	1 587 010 002	---	---
.. 953	.. 501	---	---
.. 954	.. 002	---	---
.. 956	.. 002	---	---
.. 957	.. 002	---	---
.. 958	.. 002	---	---
.. 959	.. 002	---	---
.. 960	.. 002	---	---
.. 961	.. 002	---	---
.. 962	.. 002	---	---
.. 963	.. 005	---	---
.. 964	.. 002	---	---
.. 965	.. 002	---	---
.. 966	.. 002	---	---
.. 967	.. 002	---	---
.. 968	.. 002	---	---
.. 969	.. 002	---	---
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.. 971	.. 002	---	---
.. 972	.. 002	---	---
.. 973	.. 002	---	---
.. 974	.. 002	---	---
.. 975	.. 003	---	---
.. 976	.. 004	---	---
.. 977	.. 004	---	---
.. 978	1 587 410 901	---	---
.. 979	010 004	---	---
.. 980	.. 002	---	---
.. 981	.. 002	---	---
.. 982 ①	.. 003	---	---
.. 982 ②	1 587 410 901	---	---
.. 984	010 004	---	---

① = until FD 822 ② = from FD 823

BOSCH
Geschäftsbereich KH Kundendienst Kfz-Ausrüstung

Electric fuel pump	Parts set (non-return valve + seal ring)	Non-return valve	Seal ring
0 580 254 985	...	1 583 385 006	1 580 203 002
.. 986	...	.. 386 011	.. 001
.. 987	...	.. 008	.. 001
.. 988	...	.. 008	.. 001
.. 989	...	.. 008	.. 001
.. 990	...	.. 385 004	.. 002
.. 991	...	.. 004	.. 002
.. 992	1 587 010 001	...	...
.. 996	...	.. 386 011	.. 001
.. 998	...	.. 385 004	.. 002

After-sales Service

Technical Bulletin

HOT-STARTING PROBLEMS

438

VDT-I-438/105 En
3.1980

K-Jetronic

Replaces Ed. 2.1980

Hot-starting problems can occur in various vehicles fitted with K-Jetronic. This means that when an engine is switched off whilst still hot and then switched on again after a short period, it does not start as well as it should.

The engine, the ignition system and the K-Jetronic system in these vehicles should be carefully checked. With the K-Jetronic particular attention should be paid to the:

complete system (in case of leaks),
injection valves (in case of leaks),
correct position of the air-flow sensor plate (rest position).

Instructions can be found in the vehicle-related repair manuals VDT-W-438/5.. .

If the engine still does not start satisfactorily when hot, even after checking, a timing relay can be fitted in K-Jetronic systems which are not equipped with a solenoid valve for reducing the control pressure as additional starting help.

Timing relay 0 340 000 003 controls the start valve during hot starts. The start valve then injects extra fuel intermittently (sometimes cutting out completely.

The timing valve is fitted according to the wiring diagram (see reverse side). The fitting of this relay will be charged for.

After fitting the timing relay starting should be carried out as follows:

Vehicles with start valve in intake manifold - with open throttle valve,
Vehicles with start valve in idle duct - with closed throttle valve.

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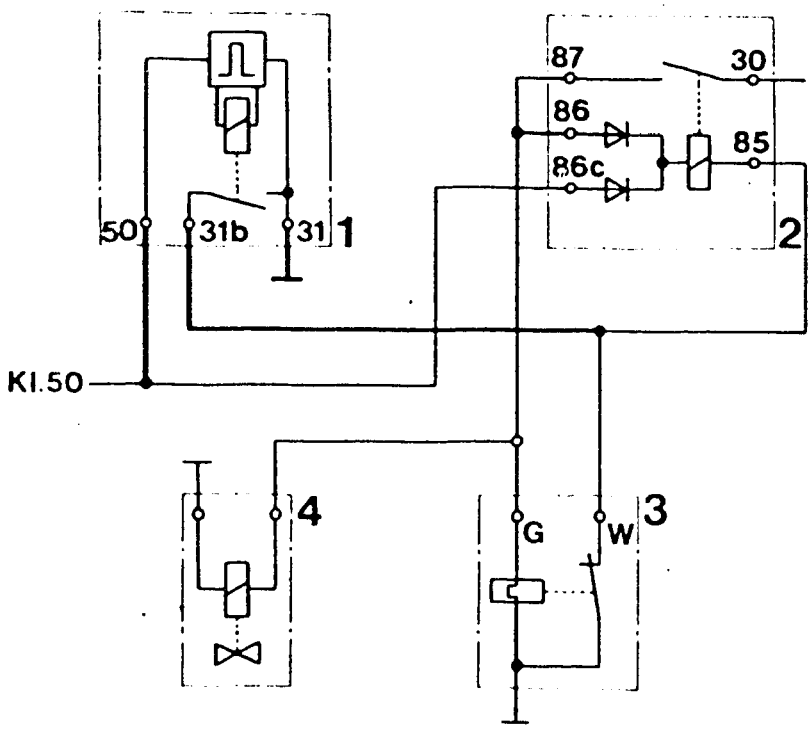
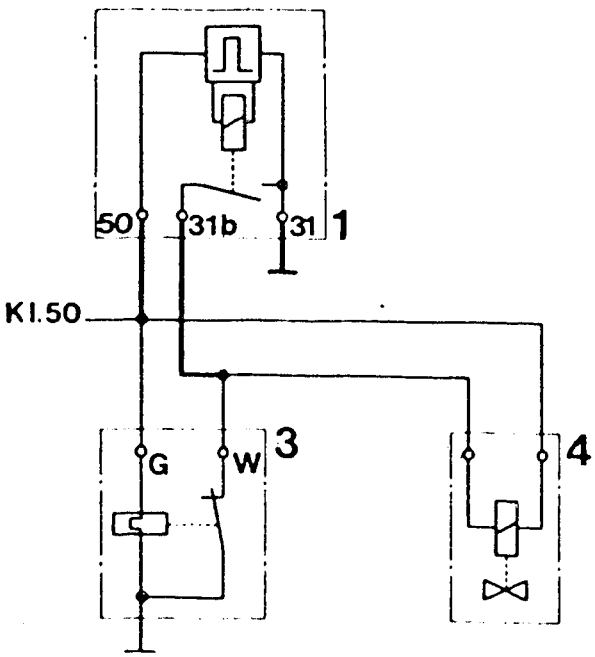


K-Jetronic system with post-injection relay

1 = Timing relay 0 340 000 003
2 = Post-injection relay
3 = Thermo-time switch
4 = Start valve



K-Jetronic system without post-injection relay

After-sales Service

Technical Bulletin

TUBE FITTING WITH FILTER IN WARM-UP REGULATOR 0 438 140 ...

VDT-I-438/106 En
4.1980

Warm-up regulator 0 438 140 065, used in MB 230 E, has a filter in the tube fitting for the fuel inlet to prevent dirt getting in.

When other warm-up regulators with the same connections give trouble or fail because of dirt getting in, then we recommend that you fit the new warm-up regulator with this tube fitting with filter, part no. 1 433 356 802.

During assembly a flat seal ring A 10 x 14 DIN 7603-C-CU, part no. 2 916 710 649, is laid underneath and the tube fitting is tightened with 20...22 Nm (2.0-2.2).

BOSCH Geschäftsbereich KH Kundendienst Kfz-Ausrüstung

After-sales Service

Technical Bulletin

FIRMLY FITTED NON-RETURN VALVE

Repairs
fuel pumps 0 580 254 ...

VDT-I-438/107 En
5.1980

Previously fuel pumps with non-exchangeable non-return valve (see VDT-I-438/104 En) had to be exchanged completely in cases of leakage in the non-return valve.

If the fuel pump is in working order and only the non-return valve leaks, there is now the possibility of repairs as part of after-sales service. 2 parts sets have been produced for this purpose, they contain, amongst other things, a tube fitting with built-in non-return valve.

Before using the parts set the installation conditions should be checked. The defective non-return valve can remain in the fuel pump which does not have to be dismantled for fitting the parts set. Before disconnecting the fuel lines the pressure fittings of the fuel pump and the fuel lines should be thoroughly cleaned.

Description and fitting

Parts set 1 587 010 003 for fuel connection with inlet union.

Screw the tube fitting (short side) with the thick flat seal ring into the pressure fitting and tighten. In doing so press against the hexagon of the pressure fitting with a wrench. Place the thin flat seal ring, the fuel-line inlet union and the other flat seal ring on to the long side of the tube fitting and tighten with the hexagon cap nut. Run the engine and check that there are no leaks in the connection.

Parts set 1 587 010 004 for fuel connection with nipple and union nut.

Screw the tube fitting with flat seal ring into the pressure fitting and tighten. In doing so press against the hexagon of the pressure fitting with a wrench. Screw the fuel line to the tube fitting with a union nut and tighten. Run the engine and check that there are no leaks in the connection.

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After-sales Service

Motor Vehicle Service Information

EXPORT VEHICLES WITH
EMISSION CONTROL SYSTEMS

VDT-I-Gen. 042 En.
12. 1981

K-Jetronic and L-Jetronic

Export vehicles for countries with stringent exhaust emission regulations are equipped with various emission control systems. To meet the legal requirements, these systems are installed either individually or in combination, depending on the model version.

Emission control system	installed predominantly in export vehicles				
	Sweden	Australia	Canada	USA	Japan
Exhaust-gas recirculation*	●	●	●	(●)	(●)
Secondary-air induction*	●	●	●	(●)	(●)
Secondary-air injection*	●	●	●	(●)	(●)
Catalytic converter*	-	-	-	●	●
Lambda closed-loop control	-	-	-	●	●

The vehicle-related After-Sales Service Instruction Manuals for the K-Jetronic and L-Jetronic describe the construction, function and operating principle of the emission control systems. The influence of these systems should be borne in mind particularly when adjusting the idle speed and CO concentration.

Export vehicles are sometimes also encountered in countries which do not have particularly stringent exhaust emission legislation. This Service Information publication summarizes the various emission control systems and provides information for the After-Sales Service in countries with exhaust emission legislation which does not require such emission control systems or unleaded fuel.

* Not made by Bosch

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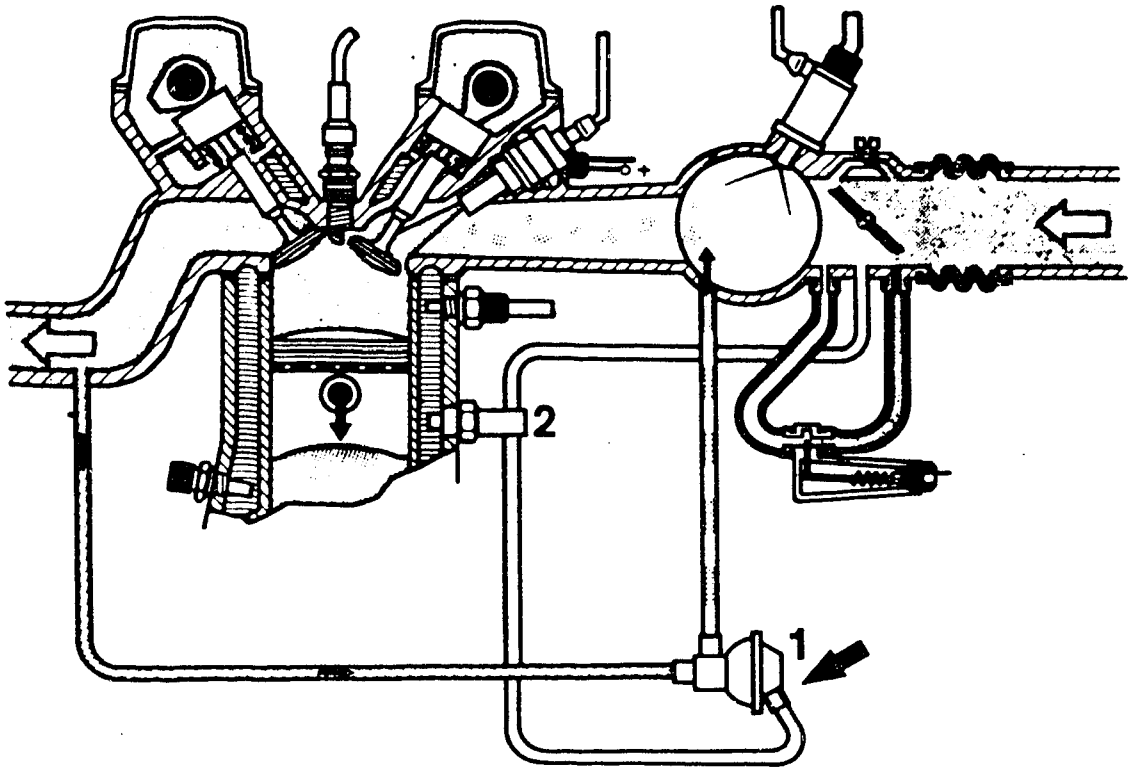
1. Exhaust-gas recirculation (EGR)



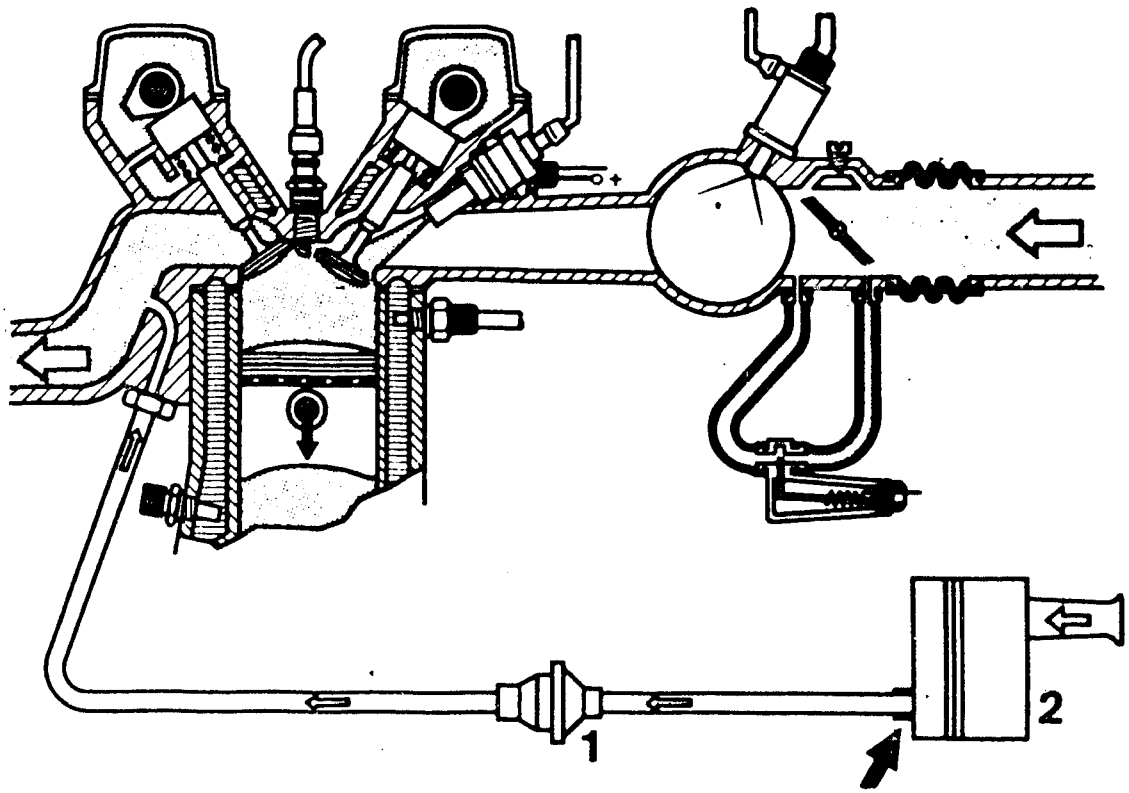
1 = Exhaust-gas recirculation valve 2 = Thermo-valve

Some of the exhaust gas is returned to the intake manifold via a vacuum-controlled exhaust-gas recirculation valve. This recirculation of exhaust gas into the combustion chamber lowers the combustion temperature and reduces the emission of nitrogen oxides (NOx). The thermo-valve and the position of the vacuum tapping port on the throttle-valve assembly ensure that exhaust gas is only recirculated when the engine is warm and only at part load. There is a reduction in engine speed of about 200 min^{-1}. Exhaust-gas recirculation is inoperative at idle, full-load and when the engine is cold.

When testing or adjusting the idle speed and CO concentration, remove and seal off the vacuum control line (arrow) on the exhaust-gas recirculation valve in order to ensure that the exhaust-gas recirculation system is inoperative.

In countries without stringent exhaust emission legislation it is not necessary to shut down the system.

2. Secondary-air induction (e.g. Volvo Pulsair system)



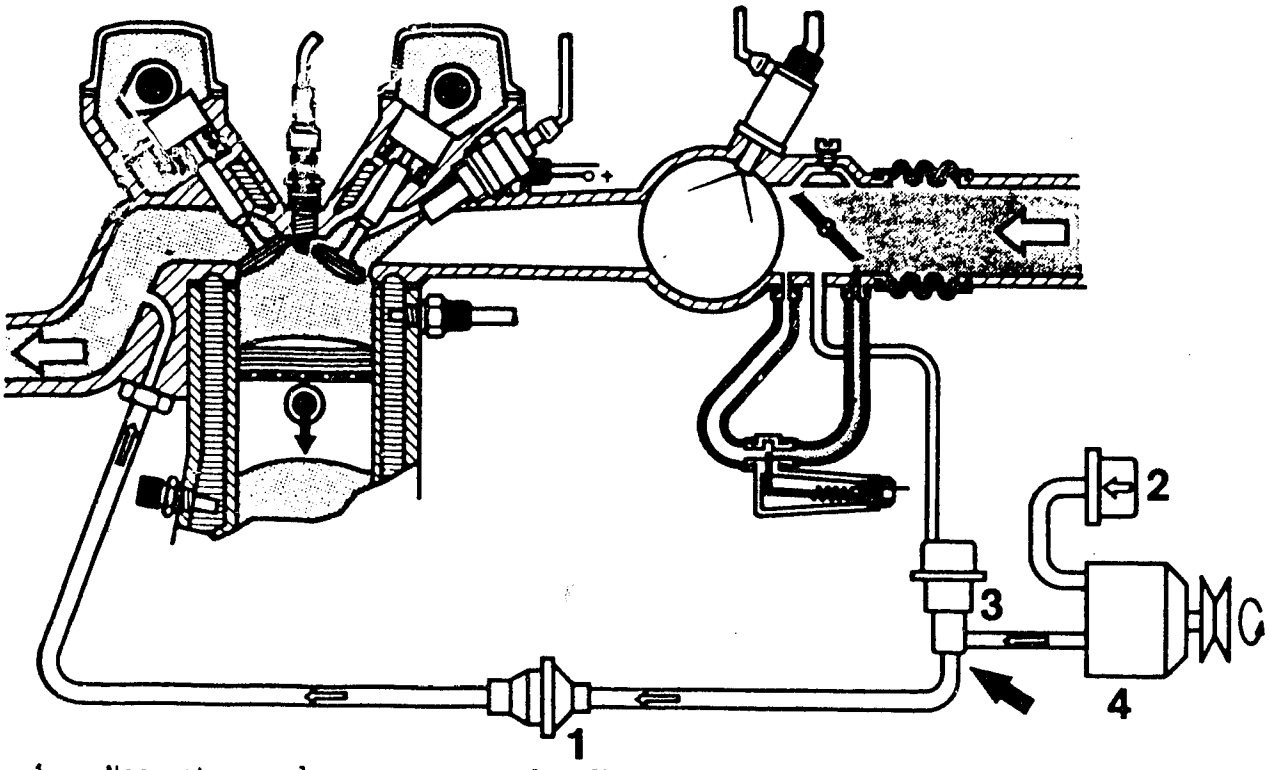
1 = Non-return valve 2 = Air filter

The pulsating alternation between overpressure and depression in the flow of exhaust gas inducts fresh air into the exhaust ports via a non-return valve. Unburned residues of carbon monoxide (CO) and hydrocarbons (HC) are partially after-burned, leading to fewer pollutants in the exhaust gas.

When testing or adjusting the idle speed and the CO concentration, the secondary-air induction system must be rendered inoperative. To do this, remove the hose between the non-return valve and the air filter on the air filter (arrow) and seal off tight with a plug.

In countries without stringent exhaust emission legislation it is not necessary to shut down the secondary-air induction system.

3. Secondary-air injection



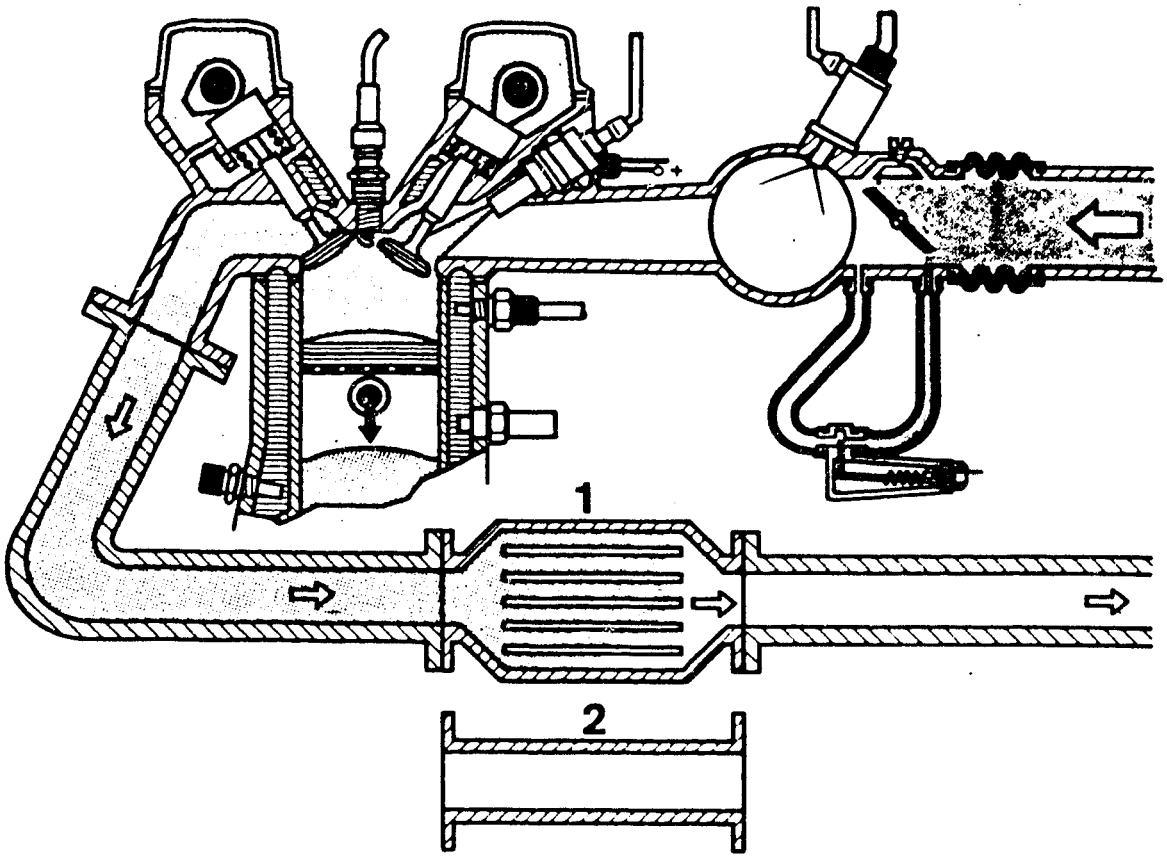
1 = Non-return valve
2 = Air filter
3 = Change-over valve
4 = Air pump

An air pump driven by the engine inducts fresh air through the air filter and forces it via a non-return valve into the exhaust ports. As in the case of secondary-air induction, there is a partial after-burning of the CO and HC residues. This makes the exhaust gas cleaner. A vacuum-controlled change-over valve controls the operation of the secondary-air injection system.

When testing or adjusting the idle speed and the CO concentration, shut down the secondary-air injection system. To do this, remove the hose from the outlet of the change-over valve (arrow) and seal off tight with a plug.

In countries without stringent exhaust emission legislation it is not necessary to shut down the secondary-air injection system.

4. Catalytic converter



1 = Catalytic converter 2 = Intermediate pipe

The single-bed catalyst installed in the exhaust system in export vehicles (also with lambda closed-loop control) reduces all three pollutants CO, HC and NOx to a minimum. The catalytic surface triggers chemical reactions of the pollutants, rendering them non-toxic.
Important: Proper operation only possible in conjunction with unleaded fuel (at present only in USA and Japan).

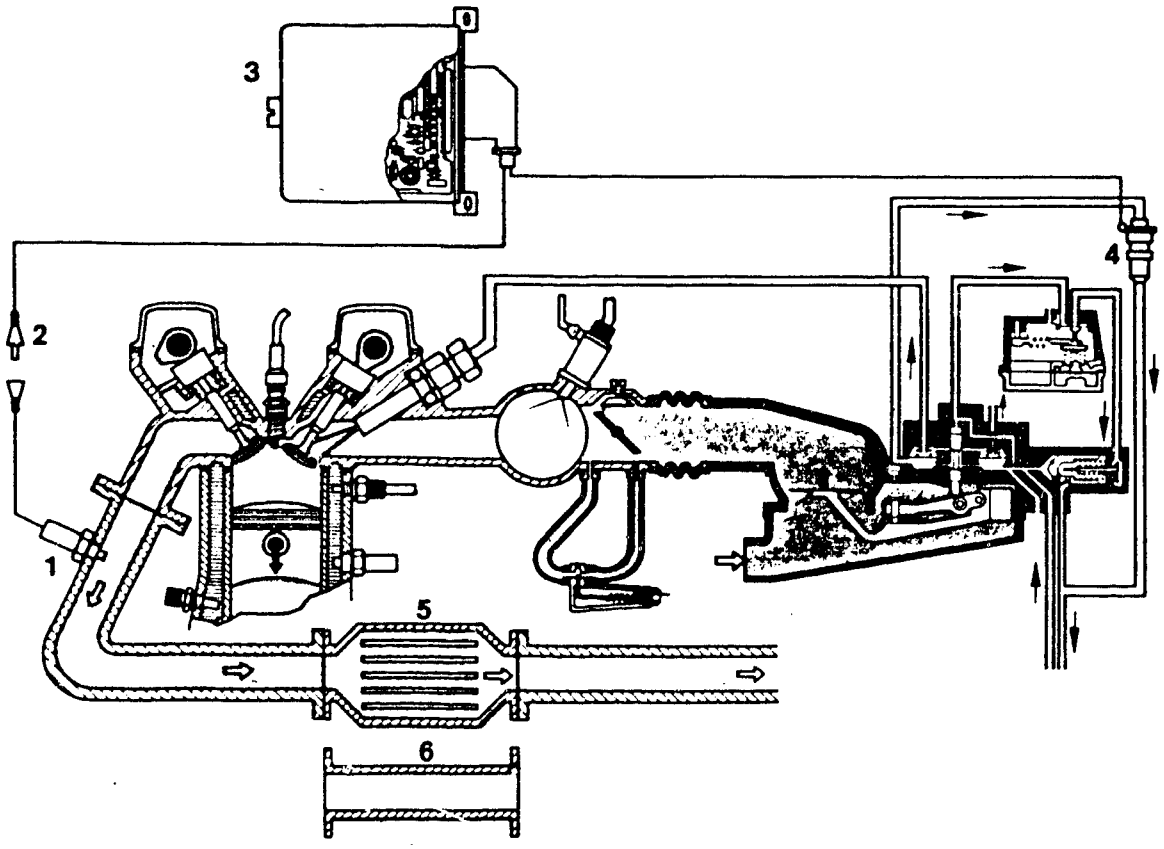
When testing or adjusting the idle speed and the CO concentration, the catalytic converter can be neglected since the exhaust-measuring point is upstream of the catalyst.

Caution!

If the vehicle is operated on leaded fuel (predominantly in countries without stringent exhaust emission legislation) the catalytic converter must be removed. If not removed, the catalytic converter would become clogged up and lead to a reduction in the power output of the engine.

Appropriate intermediate pipes for converting the exhaust system are available from the vehicle manufacturer.

5. Lambda closed-loop control



1 = Lambda sensor
2 = Plug
3 = Control unit
4 = Timing valve
5 = Catalytic converter
6 = Intermediate pipe

Export vehicles for the USA and Japan are equipped with lambda closed-loop control. This additional function of the K-Jetronic or L-Jetronic is not a downstream emission control system, but ensures a low pollutant content in the exhaust gas by means of optimum mixture preparation. Additional exhaust-gas recirculation, secondary-air induction or secondary-air injection is therefore not necessary in most cases. Like the catalytic converter, the lambda sensor (in the exhaust gas) operates only with unleaded fuel.
If the vehicle is operated on leaded fuel, the lambda sensor becomes clogged up and ceases to operate. The control unit detects this and switches from closed-loop to open-loop control. The system then operates on a fixed air-fuel ratio in the same manner as a K-Jetronic or L-Jetronic without lambda-closed-loop control. Before operating on leaded fuel, the lambda sensor should be removed and the installation hole should be closed off with a screw plug M18x1.5 (length of thread max. 8.5 mm). The disconnected plug (2) of the sensor connecting cable should be insulated and fastened to a suitable place on the vehicle body.

Caution!
Under no circumstances must the control unit or the timing valve be shut down on the lambda closed-loop control of the K-Jetronic.
The catalytic converter should be replaced by an intermediate pipe.

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